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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 37.] 1940. [No. 5.

SUMMARY OF RECENT ABSTRACTS.*

IV. TRYPANOSOMIASIS.

Epidemiology.

LESTER (p. 204) reports that by the beginning of 1938, 2,200,200 natives of N. Nigeria had been examined under the survey system, and 300,000 cases of sleeping sickness had been discovered. The disease has recently become epidemic in previously endemic areas and the reasons for this are thought to be the change in the habits of the people due to settled rule, the increase in transport facilities and the employment of gangs of labourers in various large scale enterprises. LESTER (p. 672) further shows that whereas the average infection rate found in surveys about 1930 in N. Nigeria was 9·4 per cent., recent surveys [1937–38] showed a rate of only 1·6 per cent. In only one area, however, can protective measures have had anything to do with this reduction. The disease is now much more under control than formerly and large scale preventive campaigns have been started to consolidate the gains of previous years.

DE BRAUWERE (p. 655) states that in parts of the Belgian Congo trypanosomiasis has not only become less malignant but has been greatly reduced. During 1936 new cases diagnosed were 0·4 per cent. of those examined. In the Foréami Report for 1937 (p. 656) it is explained that although the phyto-geographical condition may be identical over the whole of a sector, the disease is not uniformly distributed. Explanations of this fact may be the occupations and habits of the natives, the extent of large clearings, the introduction of exogenous infection, insubordination or migration of the population. The rapid retrogression sometimes noticed cannot be explained by medical action, since this is equal in other areas in which retrogression does not take place, and it is thought that a degree of immunity may develop in districts which have been long infected, and it has been shown that trypanosomes tend to lose transmissibility after repeated passages through the same vertebrate host. But in recent foci regression under Foréami control is rapid ; in older foci it is slower.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1939, Vol. 36. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

The nutrition of the population is an important factor in an anti-sleeping sickness campaign.

In French Equatorial Africa SALEUN (p. 658) reports that the proportion of infection fell from 0·81 per cent. in 1936 to 0·61 per cent. in 1937.

In Uganda BROWN (p. 223) considers that an equilibrium has been attained between *T. gambiense*, man and *G. palpalis*, but is not yet perfect. Symptomless human reservoirs are numerous and owing to the complexity of rivers widespread infection is inevitable. CORSON (p. 737), found that some monkeys infected with *T. gambiense* lived for long periods (up to 1,174 days) and suggests that similar chronic infections, possibly undiagnosed, may occur in man [and if so, may be of epidemiological, no less than clinical, importance].

BLAIR (p. 736) found two persons harbouring *T. rhodesiense* in a village in S. Rhodesia; neither gave a definite history of illness. Other villagers were not infected, yet visitors, both European and native, had been infected and the trypanosomes were fully virulent. Blair believes that the infection is stored in a human, but not in a game, reservoir and that local outbreaks always follow the establishment of a man-fly-man cycle. The carrier state is discussed.

Sleeping sickness has been reported from Bechuanaland (p. 659) further south than was previously known.

Aetiology.

HOARE (p. 205) has correlated the data obtained by the study of the shape, size and position of the kinetoplast (*i.e.* the kinetonucleus alone, without the blepharoplast) in mammalian trypanosomes and gives a list of the features distinguishing the various groups in this respect. On this basis he cannot accept the validity of Jacono's classification.

CRISTIANI (p. 661) has succeeded in infecting guineapigs and mice with trypanosomes and spirochaetes through the external auditory meatus and the nasal mucosa.

CORSON (p. 208) reports further work, on a strain of *T. gambiense* transmitted by *G. morsitans*, which tends to substantiate his previous view that a typical strain does not easily change so as to resemble *T. rhodesiense*; no change in virulence or morphology was observed. By direct transmission, however, an increased virulence for rats developed; the strain became less polymorphic and nuclear displacement was rare, but there was no real resemblance to any Tanganyikan strains of human trypanosomes.

ROUBAUD and PROVOST (p. 746) found that growth was arrested in three young mice inoculated with *T. gambiense* and recall the infantilism which has been attributed to *T. cruzi* infection.

HALBERSTAEDTER (p. 213) has investigated the effect of X-rays on *T. gambiense*.

CORSON (pp. 208, 662) as a result of the maintenance of a strain of *T. rhodesiense* in sheep and antelopes by cyclical transmission through *G. morsitans* over a period of 4 years, and tested on human volunteers, found that the infectivity to man was not lost, but does not conclude that all strains would retain it or that if it were lost under these conditions it would be so lost in nature. *T. rhodesiense* is probably a parasite of man and of wild and domestic animals and may retain its infectivity to man, even when living only in animals, for several years or perhaps indefinitely. Using white rats as test animals, no change in virulence was observed (p. 210).

BLAIR (p. 736) in S. Rhodesia finds little support for the view that *T. brucei* and *T. rhodesiense* are the same organism.

Transmission.

SICÉ and TORRESI (p. 663) discuss the influence of vapour tension and temperature on the biology of various species of Glossina. They (p. 664) show that in the French Sudan, in spite of the severe atmospheric conditions during 4 or 5 months of the year, the pupae are resistant and certain flies, a large proportion being females, ensure survival from one favourable season to another. MOREAU (p. 664) discusses the classification of climate from the point of view of East African biology, and DAVY (p. 665) the classification of tropical woody vegetation types. These papers cannot be further abstracted but are important in the study of Glossina. BROOM (p. 662) describes his method of maintaining *G. morsitans* in England after the receipt of pupae by air from Tanganyika Territory. A humidity of 80 per cent., a temperature of 24°C. and either daylight or artificial lighting were effective and 23 per cent. of living flies were obtained. The cycle of development of *T. brucei* occupied at least 25 days and the flies were fed, after the infective feed, thrice weekly on clean guineapigs for 3 weeks and thereafter at the same intervals on chickens.

GHIDINI (p. 214) records the tsetse flies of Italian East Africa. *G. morsitans* and *G. palpalis* are present in some parts but *G. tachinoides* has not been found, though it occurs in S. Arabia.

CORSON (p. 208) points out that people differ in resistance to infection; that is, an infected fly may infect one person but not another. Similarly a person may resist infection from one fly but become infected by another fly which had acquired its infection at the same time and from the same animal as the first, unsuccessful, fly.

Clinical.

LESTER (p. 204) describes three types of sleeping sickness seen in N. Nigeria. The commonest, often constituting more than 95 per cent. of cases seen, is a mild form in which equilibrium is established with the patient in poor condition and with a lowered resistance to other diseases, which is at the root of the depopulation which has occurred. In the second type toxaemia is the salient feature and oedema is common; the patients die without any sign of involvement of the nervous system. The third is the classical type with the characteristic " sleeping " stage. The first type usually preponderates but in the more virulent epidemics the second and third are relatively more numerous.

In diagnosis the method of the Foréami staff (p. 656) is that gland palpation is always performed by Europeans, and the examination of gland juice and blood by native microscopists under constant supervision. DE BRAUWERE (p. 655) states that the Foréami staff performed lumbar puncture on 93 to 95 per cent. of the definitely diagnosed cases, and gives a table of the cell counts.

GUIBERT and BOSCQ (p. 216) found *T. gambiense* in the bone marrow of 29 of 30 untreated patients, in 1 of 6 suspected patients and in 1 of 2 previously cured but recently again ill. Bone marrow examination is therefore of diagnostic importance. JOSPIN and GALLAIS (p. 217) found trypanosomes in the sternal marrow of a patient whose blood was negative. THIROUX in comment, however, points out that injection of Cercopithecus is a more delicate test of blood than triple centrifugation and that apparently negative blood may thus be shown

actually to be positive. SALEUN (p. 658) makes the point that in the nervous period the glands may not be palpable and parasites may disappear from the peripheral circulation though multiplying readily in the central nervous system. Clinical signs may not be obvious and the different means of diagnosis may all have to be used in addition to close interrogation of the patient. Lumbar puncture is reserved for those in whom trypanosomes are found and for suspects.

LEFROU and GOARNISSON (p. 738) find that in the Ivory Coast non-infected persons show very much the same ocular lesions as those infected with trypanosomes. Detailed figures are given and it is concluded that although before treatment infected persons may show ocular lesions, particularly optic neuritis, these are not necessarily pathognomonic.

RADNA (p. 666) advocates the use of a fluorescence microscope in diagnosis.

CORSON (p. 208) draws attention to the local swelling, with associated axillary pain, caused by trypanosomes at the place of infection on the arms of 29 of 30 volunteers. The swelling appears 5 to 7 days after the bite and trypanosomes appear in greater numbers and earlier in blood drawn from the swelling than in blood from the ear. Corson describes this as a very definite swelling and a sure sign of infection.

CORSON (p. 210) found *T. rhodesiense* in the cerebrospinal fluid of 22 of 27 infected monkeys. In one the disease lasted only 19 days, and he points out that in man the cerebrospinal fluid may contain the trypanosomes at an early stage after infection and that very early diagnosis and treatment are therefore important.

Treatment.

LAUNOY (p. 744) found that single large doses of orsanine or anthiomaline were more toxic to mice than the same amounts given fractionally at intervals of a few hours, but that the therapeutic efficiency decreased with the lengthening of the intervals between the fractional doses. The optimum results were obtained when the doses were given 24, 28 and 32 hours after infection. This fractional method of treatment should be tested in man.

DE BRAUWERE (p. 655) describes the standard Foréami treatment as a preliminary injection of 1 gm. Bayer 205 or moranyl followed by 12 or 14 of trypanarsyl. It is stated (p. 657) that European supervision is now concerned more with the regularity of the courses than with the technique of administering them. Systematic re-examination for two years is employed to control the efficiency of treatment. ROUSSEAU (p. 670) has used mixtures of moranyl and anthiomaline in a few cases. REYNES and TRINQUIER (p. 667) give details of the methods and results of treatment in the Cameroons.

SICÉ and TORRÉSI (p. 669) write of synergic medication, the simultaneous injection of different compounds in doses individually insufficient to produce cure. Excellent results were obtained and are detailed, and the best mixture was found to be moranyl and tryparsamide. Tartar emetic with trypoxyl, and tartar emetic with orsanine were also useful. Details of dosage are given and it is pointed out that it is not a question of addition but of multiplication of the properties of the drugs simultaneously injected.

HAWKING (p. 742) found that Bayer 205 had practically no trypanocidal action *in vitro*, but if normal trypanosomes are incubated with it

they fail to infect: trypanosomes fast to the drug do not lose their infectivity under these conditions. VAN DEN BRANDEN (p. 668) lays down criteria for the toxic and therapeutic standardization of Bayer 205. CORSON (p. 667) at first thought that the various illnesses experienced by a group of infected volunteers undergoing treatment with Bayer 205 were not attributable to the drug, except albuminuria. Further observation, however, during the period after cessation of treatment, when nothing but trivial conditions were found, has led him to the conclusion that possibly the drug had some connexion with the complications experienced, and in particular he mentions a painful condition of the feet, possibly peripheral neuritis (p. 741).

BOURSNELL *et al.* (p. 668) give further information on a method for determining Bayer 205 or antrypol in tissues and urine. They confirm the previous opinion that a course of injections results in a more satisfactory maintenance of the drugs in the plasma over long periods than does a single injection of the same total amount. VIERTHALER and BOSELLI (p. 742) show that the serum of small animals before the administration of Bayer 205 gives a certain amount of yellow coloration with the reagents used for the detection of the drug. The blank value varies in the same animals from time to time and should therefore be obtained shortly before the drug is given. Rabbits were protected against *T. brucei* at serum concentrations of 1 mgm. Bayer 205 per 100 cc.

In an analysis of the trypanocidal action of trivalent arsenicals and acriflavine, HAWKING (p. 220) shows that the reaction between the drug and the trypanosome probably occurs in three stages: fixation, secondary chemical reactions and eventual death of the organism. This paper cannot further be abstracted.

LESTER (p. 204) found that toxic symptoms after tryparsamide only occurred when boiled and filtered water were used instead of distilled water, and this difficulty was overcome by the provision of portable stills. Routine treatment in N. Nigeria now consists of three 1 gm. doses of Bayer 205 or antrypol followed by five 2 gm. doses of tryparsamide.

ASTRACHAN and FRANKS (p. 670) describe the nitritoid reaction (resembling the action of amyl nitrite) experienced by a patient after injection of tryparsamide. A later reaction consisted of urticaria followed by diffuse erythema, which disappeared in two days. The Foréami staff (p. 656) found that males were more subject to visual disturbance than females after treatment by arsenicals, but the proportion of definite blindness was equal, and less than 1 per cent. The frequency of accidents increased with age and they were most common at the beginning of treatment. BERTÉ (p. 671) dissolves atoxyl in 10 per cent. sodium citrate solution for subcutaneous injection, this prevents the pain caused by atoxyl alone.

KING *et al.* (p. 221) show that undecane diamidine can cure mice and rabbits infected with a laboratory strain of *T. rhodesiense*, but has no effect on *T. congolense* or *T. cruzi*, though it can be used in the prophylaxis of the former infection. It has a definite action in benign tertian malaria. They discuss the action of other similar compounds which with synthalin form a new group of trypanocidal and antimalarial drugs.

HAWKING (p. 671) states that atebrin is only slightly absorbed by trypanosomes and the degree of absorption is in relation to its slight

trypanocidal properties. He (p. 660) shows that the fact that trypanosomes become photosensitive after exposure to acriflavine can be used quantitatively to determine the quantity of acriflavine in the trypanosomes or the medium.

Drug Resistance.

In a study of drug resistance, LOURIE and YORKE (p. 221) found four types of resistance in *T. rhodesiense*: (*a*) resistance to the aromatic compounds of arsenic and antimony and to acriflavine, (*b*) superadded tartar emetic resistance, (*c*) resistance to Bayer 205, and (*d*) resistance to the amidine and guanidine compounds. Each of these is specific for its own group of chemical compounds.

From their work on drug resistance VAN HOOF *et al.* (p. 211) conclude that resistance to Bayer 205 is an unstable character which progressively diminishes on mechanical passage through animals of the same or different species and even completely disappears on cyclical transmission through *G. palpalis*. In the epidemiology of Gambian sleeping sickness it is considerably less important than the corresponding arsenic-resistance.

Two arsenic-resistant strains of trypanosomes were isolated in the Belgian Congo (p. 656). Others were reported but in the absence of detailed study it is impossible to be certain that these were cases of true arsenic-resistance. From N. Nigeria (p. 736) it is reported that four 2 gm. doses of tryparsamide did not increase the resistance of the parasite [*T. gambiense*] to the drug in two patients from whom isolation was effected both before and after treatment.

LAUNOY and LAGODSKY (p. 212) have found that a strain of *T. annamense* made resistant to arsenic is less sensitive to antimony than a normal strain. LAUNOY (p. 212) shows that the natural chemo-resistance of *T. congolense* is not identical with the artificial chemo-resistance of *T. annamense*.

Prevention.

LESTER (p. 672) writes of the policy of compulsory surveys and mass treatment in N. Nigeria. In addition anti-tsetse clearing by local communities and the removal and in some instances concentration of populations are essential and are the only certain methods of control. The establishment of field sleeping sickness dispensaries has played a big part in reducing the infection rate and in controlling the disease; in many localities once the incidence has been diminished by mass treatment, dispensaries can cope with relapsed cases and fresh infections, and it is hoped that mass treatment will only be required occasionally in a few areas.

Discussing the decrease in the *G. swynnertoni* population which results from densification of woodland vegetation in East Africa when fire is excluded, NASH (p. 224) points out that in N. Nigeria the climatic conditions are so severe that such densification is needed by tsetse for survival. He therefore advises that densification by fire exclusion should not be practised generally, and should only be allowed in forestry reserves where *G. morsitans* does not occur. Streams should be cleared and fuel plantations should be sited between streams and not within ¼ mile of them. Densification, however, may be successful in the cooler and moister climate of S. Nigeria where the flies prefer more open conditions. Deforestation and soil erosion are serious problems but there need be no real conflict between woodland conservation and

tsetse control provided that care is taken in the siting of forestry reserves and fuel plantations.

Brown (p. 223) in Uganda shows that the fly population in all rivers is small and abrupt changes in water volume, by destroying pupae, will never allow it to increase. *G. palpalis* can seldom leave the river beds, and narrow strip debushing can therefore alter conditions so as to prevent its further existence. He gives details of strip clearing for rivers and roads, points out that river clearing should progress down stream to prevent the fly from being driven into the maze of head waters and emphasizes the importance of hand catching. Livestock act as a biological barrier and should not be removed, but rather introduced deliberately. Antrypol may be used to protect clearing gangs and 1·0 gm. will protect for 3 months. Symes and Southby (p. 740) report on the block method of reducing *G. palpalis* on the shore of Lake Victoria. Hand catching, collection of pupae, and trapping were used but the latter was ineffective. Hand catching was the most economical. The decrease in *G. palpalis* varied from 50 to 90 per cent., and even with high densities of fly hand catching can be employed successfully. The flies can cross open water 400 yards wide.

Chorley (p. 673) discusses controlled game destruction and the creation of fly-free buffer zones in S. Rhodesia, showing that these have now passed beyond the experimental stage and can be applied to any area on the periphery of a fly belt wherever land is required for development. Judicious controlled game destruction may be combined with the establishment of game sanctuaries in areas cleared of fly.

Trypanosomiasis of Animals and Experimental Work.

Brown and Broom (p. 217) describe the red cell adhesion test as a specific serological reaction. Trypanosomes, immune serum, complement and human red cells are incubated together and if the serum is homologous the red cells become firmly adherent to the trypanosomes. Standard concentrations of red cells and trypanosomes are necessary to obtain constant results and agglomeration and lysis of the trypanosomes may take place even if the red cells are not suitable as indicators (as is the case with certain human red cells). Certain bacteria adhere to sensitized trypanosomes while others fail to do so.

Brown (p. 218) found that in mice the electrical charge of polymorphic trypanosomes undergoes a reversal of sign if relapse occurs after spontaneous cure. The nature of the host apparently has a definite effect upon the sign of the charge of trypanosomes. A simple test is described for determining the sign, positively charged trypanosomes becoming adherent to the red cells. Broom and Brown (p. 660) show that when positively charged *T. brucei* are taken into *G. morsitans*, one reversal of sign takes place in the gut and a second in the salivary gland. With negatively charged trypanosomes the only reversal is in the salivary glands.

Nicolle and Simons (p. 746) have studied the blood sedimentation rate in animals infected with trypanosomes; Yorke suggests that the increased rate may be due to the autoagglutination which occurs at low temperatures.

Discussing the passively transferable antibodies responsible for inhibition of reproduction (ablastin) and trypanocidal activity, Taliaferro (p. 214) shows that these occur in *T. duttoni* infections of

mice as well as in *T. lewisi* infections of rats. Group reactions are described.

CULBERTSON and KESSLER (p. 750) found that rats, especially older rats, can be rendered completely resistant to *T. lewisi* by the repeated injection of formolized homologous antigen. Agglutinins are developed to a titre roughly related to the degree of resistance acquired. CULBERTSON (p. 751) found that treatment with Bayer 205 was more effective in older than in nursling rats infected with *T. equiperdum* and concludes that the difference is probably related to a difference in the phagocytic capacities of the cells at different ages. He (p. 752) shows that with trypan blue there is a difference in phagocytic capacity between young and old rats, the latter being the more active. This may be correlated with the greater resistance of the old against *T. lewisi*.

He further (p. 751) shows that resistance against *T. lewisi* may be transmitted from a passively immunized mother rat to the young she nurses and depends on an antibody similar to that in the blood of the parent. He (p. 751) shows that rats can be immunized with antiserum administered *per os* during the usual nursing period but that towards the end of that period the method becomes progressively less effective.

BINNS (p. 747) shows that there is considerable difference in the susceptibility of individual animals to *T. congolense* and that different strains of the parasite vary in pathogenicity.

FRENCH (p. 747) discusses carbohydrate metabolism in *T. congolense* and *T. brucei* infections, and (p. 215) describes the effect of *T. congolense* and *T. brucei* on some inorganic blood constituents.

PARKIN (p. 219) records instances of spontaneous cure in infections with *T. congolense* and *T. vivax*, but none has been observed with *T. brucei* or *T. equiperdum*.

DELIDIMITRIOU (p. 747) obtained satisfactory results with surfen C in cattle infected with *T. congolense*. VAN SACEGHEM (p. 748) also considers it to be a drug of great value, but VAN RENSBURG (p. 222) reports unfavourably on the treatment with surfen C of bovines and ovines infected with *T. congolense*.

VAN DEN BRANDEN (p. 743) obtained temporary blood sterilization in rats infected with *T. brucei* by exposing them to the vapour of Bayer 205.

POP and BUDAC (p. 743) conclude from their work with anticoman that it acts directly on trypanosomes and not by producing hypoglycaemia, thus supporting the work of YORKE and his colleagues on synthalin.

LAGODSKY (p. 743) found that a prophylactic dose of an antimonial had no preventive action against an arsenic resistant strain of *T. annamense* but that it definitely attenuated its virulence and pathogenic power.

HOARE and BROOM (p. 661) find it possible to differentiate *T. uniforme* from *T. vivax*, even in mixed infection, by measuring the lengths of 100 individuals as a minimum.

MANNOZZI-TORINI (p. 745) describes a centrifugation method for the separation of trypanosomes from the blood and has studied the proteolytic activity of *T. evansi* emulsions prepared in this way.

Further work on animal trypanosomiasis has been abstracted during the year but is not included in this Summary since it has no immediate practical application to human disease.

Chagas's Disease.

Epidemiology.

Talice and his co-workers (pp. 225, 226) have recorded cases from parts of Uruguay hitherto believed to be uninfected, and Mazza *et al.* (p. 752) report 68 from the Chaco, of whom 44 were under the age of 10. Of 506 *T. infestans* collected from the houses, 184 were infected.

Transmission.

Cardoso (p. 228) studied the transmission of Chagas's disease. The trypanosomes can pass the intact conjunctiva, vaginal, buccal and rectal mucous membranes and lightly scarified skin, but did not, in his experiments, pass through intact skin. Infection by bite of infected *T. infestans* was unsuccessful except in one experiment and in this case the author thinks that it may have been due to regurgitation of trypanosomes from the intestine, but Yorke in comment suggests that the mouth parts of the bug may have become contaminated from faeces shortly before the experiment commenced. Brumpt (p. 753) also failed to infect a young rat by the bite of 50 Reduviid nymphs the dejecta of which were infective for rats of the same age, thus confirming the generally accepted view that the usual mode of infection is by infected excreta.

Gasic (p. 229) found infection in Triatoma varying from 18·5 to 51 per cent. in Santiago Province, Chile. No disease was found in man or animals, but the author has little doubt that it does exist in view of the high proportion of bugs infected, and thinks that xenodiagnostic methods might reveal its presence. Crithidial and metacyclic forms of *T. cruzi* were found in the duodenum and rectum of *Eutriatoma maculata* by Dias and Torrealba (p. 229) infected in nature in S. America. Ferreira and Deane (p. 754) in the Amazon estuary show that the faeces of infected *Clerada apicicornis* are infective. Pifano (p. 753) shows that *Psammolestes arthuri*, a Reduviid of Venezuela, though not yet found infected in nature is a potential transmitter.

Deane and Jansen (p. 754) found *Marmosa cinerea*, a small opossum, to be a natural reservoir in the State of Pará.

Immunity.

Culbertson and Kolodny (p. 231) demonstrated that rats which have recovered from a *T. cruzi* infection are completely immune to reinfection. The serum of a recovered animal will not prevent but will modify infection in another and will temporarily reduce the number of trypanosomes when given as a treatment. Kolodny (p. 755) shows that a non-specific resistance to *T. cruzi* is developed in rats, increasing with age. There is no specific serum antibody responsible for this and it is closely correlated with physiological maturation and endocrine function. Similar results were found when infection was induced *per os* (p. 755).

Clinical.

Lobo *et al.* (p. 228) give figures of the prevalence of endemic goitre in the Northern Argentine. Proportions varying from 15 to 45 per cent. of the general populations examined were found to be goitrous, and in children the figures were still higher. Most of the swellings were small. This is an important record in view of the supposed association between thyroid enlargement and Chagas's disease which

may, in fact, be no more than accidental. TALICE *et al.* (p. 225) report a condition which they describe as acute congestive thyroiditis of trypanosomal origin during the early part of infection with *T. cruzi*. They (p. 226) describe a " septicaemic phase " of the disease in which general adenitis and slightly enlarged spleen were present.

Xenodiagnostic tests were found positive by DIAS (p. 230) in two patients 16 years after first infection.

Treatment.

TALICE *et al.* (p. 227) used a preparation " Sulfanil " Emar, two tablets, each of 0·3 gm., daily by mouth for 15 days in the treatment of a typical case, and consider it to have been highly beneficial.

C. Wilcocks.

LEPROSY.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

PEARCE (p. 328) discusses leprosy in N.W. China.

MUIR and CHATTERJI (p. 328) show the importance of contact and refer to the success of voluntary isolation in a village in Bengal.

MUIR (p. 328) points out the high incidence of leprosy in hot, low-lying areas of Africa and attributes great importance in spread to dirty and promiscuous habits. In S. Africa the modification of the compulsory system to permit the release of uninfective and recovered patients has proved very successful in inducing patients to come for treatment. Compulsion is used in Basutoland, but in other countries is impracticable ; the Uzuakoli system (Nigeria) of clinics in villages surrounding the settlement is commented on with approval. JOHNSON (p. 329) refers to the work of leprosy inspectors in Basutoland ; early cases now form 38 per cent. of admissions.

MALDONADO ROMERO (p. 330) gives details of a method of calculating the number of lepers in Colombia. GEORGE (p. 330) found an incidence of 3·6 per 1,000 in the municipality of Sotomayor, Colombia.

MARCHOUX (p. 331) discusses the conclusions which may be arrived at from the study of human and rat leprosy ; contact infection, long latency, individual resistance and spontaneous cure are mentioned.

COCHRANE *et al.* (p. 331) have succeeded in infecting monkeys with human leprosy material after splenectomy. BURNET and JADFARD (p. 331) report apparently successful infection of a hamster by repeated feeding with leprosy material. MANALANG (p. 332) has attempted to evaluate the significance of segmented and granular forms of *Myco. leprae* in a large number of lesions studied, but has not been able to arrive at a definite conclusion.

Complement fixation tests were found by SARDJITO (p. 332) to be ineffective in differentiating the Sidik bacillus (from a gluteal abscess) from the leprosy and tubercle bacillus. LIMA and ARANTES (p. 332) report success in cultivating *Myco leprae* in modified Sauton medium. GAVRILOV and FESTER (p. 333) have cultivated the rat leprosy bacillus in animal tissue cultures.

GAVRILOV *et al.* (p. 333) conclude that vitamin deficiency may predispose guineapigs to infection with rat leprosy, and GMINDER

(p. 333) considers that in man deficiency of vitamins predisposes to leprosy infection and that vitamin B_1 is useful in treatment. MUIR (p. 333) holds the view that natural resistance to leprosy is in proportion to the general health, is low in children, but does not vary much in families or races. Acquired resistance may be systemic or local.

FUERTES and PERUCHENA (p. 334) describe the morbid changes in the ulnar nerves of a case of mixed leprosy. STEIN (p. 334) describes the hyperergic inflammatory changes, extending to necrosis and suppuration, in the leprotic lesions during the course of the lepra reaction.

LARA (p. 335) considers that the leprolin [lepromin] test has no value as an index of resistance of children over 1 year of age, that it has no prophylactic value and may even act provocatively in such children. IGNACIO (p. 335) records the results of the test in bacteriologically negative cases and LAGROSA (p. 335) the results in bacteriologically positive cases. In the latter the results could not be correlated with the clinical changes. MENDES and GIL DE CASTRO CERQUEIRA (p. 336) discuss this reaction. The preparation used must be standardized and the reaction is valuable in the estimation of local immunity. WADE (p. 336) considers that lepromin is a better name than leprolin for the preparation used.

RADNA (p. 336) regards the Witebsky, Klingenstein and Kuhn reaction as of diagnostic value in neural leprosy in which bacteriological examinations may be negative. He (p. 337) considers that the Wassermann reaction is only positive when there are syphilitic lesions requiring treatment. SCHUJMAN (p. 337) describes the histamine test to differentiate leprosy from syringomyelia.

DHARMENDRA (p. 337) found a shift to the left in the Arneth count in leprosy.

RYRIE (p. 337) shows that plantar hyperalgesia to the heavy stroking of the sole of the foot with a hard instrument is an early sign of leprosy reactions and is associated particularly with progressive disease with bad prognosis. GERMOND (p. 338) gives points of differential diagnosis between circinate tuberculoid leprides and polycyclic syphilides.

CAMPOS (p. 338) discusses the benignity of certain forms of leprosy in children. RODRIGUEZ and WADE (p. 338) trace the progress of cases of untreated neural leprosy observed for 5 years, and of two patients with major tuberculoid leprosy. RISHI (p. 339) shows that relapse is more common in lepromatous cases than in neural, and that relapse after 10 years of arrest is rare.

MUIR (p. 340) points out that Epidermophyton infections are troublesome complications of leprosy and are apparently predisposed to by the loss of power to sweat. The treatment advised is detailed.

PLUCHON (p. 340) and BEAUDIMENT and RIVOALEN (p. 340) discuss the neutralization of chaulmoogra oils necessary for injection purposes. The activity is not diminished. DUBOIS and RESSELER (p. 340) describe the emulsification of chaulmoogra oil for intravenous injection. VESPOLI (p. 341) describes his method of treating the ulcers of leprosy by " percutaneous " injections of creosoted chaulmoogra oil around the ulcers and a chaulmoogra dressing.

RADNA (p. 342) describes the preparations he uses for intravenous and intradermal injections. NARAYAN (p. 342) reports some success with neem oil, IRVINE (p. 342) comments on the poor results obtained with M. & B. 693, and WHITCOMB (p. 342) on rubrophene in the treatment of leprosy. COCHRANE *et al.* (p. 342) used fouadin with success in the febrile reactions of the lepromatous type of leprosy.

In the *International Journal of Leprosy* (p. 343) the results of the excision of solitary lesions in 19 instances are given. DHARMENDRA and CHATTERJI (p. 343) have excised 22 early neural lesions with some success during the as yet limited period of observation.

JOHANSEN (p. 343) regards fever treatment with the Kettering hypertherm as most unsatisfactory ; the disease is unaffected and the complications due to the fever may be severe.

LLERAS RESTREPO (p. 344) discusses preventoria for the healthy children of lepers. *C. W.*

PEARCE (Robert). **The Distribution of Leprosy in North West China.**—*Leprosy Review.* 1939. Oct. Vol. 10. No. 4. pp. 201–206. With 1 map.

This paper deals with the incidence of leprosy in the upper reaches of the Yellow River and the mountainous regions around it in patients seen at the China Inland Mission hospital at Kaolan (Lanchow) near the Great Wall. The patients included Chinese, Moslems and Tibetans, the disease being more severe in the first two races. Most of the patients came from the more inhabited river valleys. *L. Rogers.*

MUIR (E.) & CHATTERJI (K. R.). **The Record of a Leprous Village.**—*Leprosy Review.* 1939. Oct. Vol. 10. No. 4. pp. 208–220. With 2 figs.

This is an instructive survey, and later re-survey, illustrated by a map and family trees of a Bengal leprosy infected village. In 1934 there were 19 cases, 10 of them infectious, among 77 people ; an incidence of 24·6 per cent. The cases were mostly in families and in adjacent houses. One patient had apparently infected no less than 15 others. Propaganda secured the voluntary isolation of the 10 infective patients in rooms separated from the healthy, where they had their meals. Five years later the village was re-surveyed, when 16 cases were found among 81 people, 19·7 per cent. The seven original highly infective patients were still infective, but no new cases had arisen from them, so the home isolation appears to have been effective. *L. R.*

DHARMENDRA. **Re-Survey of the Village Debipur Hir.**—*Leprosy in India.* 1939. July. Vol. 11. No. 3. pp. 87–92.

MUIR (E.). **Leprosy in East Africa.**—*Internat Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 383–394. With 1 fig. (map).

This paper deals with the results of a tour in East Africa, and has already been abstracted. [See this *Bulletin*, 1939, Vol. 36, p. 531.] *L. R.*

LEPROSY REVIEW. 1940. Jan. Vol. 11. No. 1. pp. 1–74. With numerous illustrations.—**Special African Number** [MUIR].

This number records a tour through Nyasaland, Rhodesia, Belgian Congo, South Africa and Nigeria. The detailed account of leprosy

work in Africa is mainly of local interest, but the most important points are summarized in an introductory note.

Leprosy is common in all parts of Africa except in dry deserts inhabited by nomadic tribes. In Southern Central Africa it is most common in the hot low-lying moist areas along Lake Nyasa and in the Zambesi basin, with a preponderance of open lepromatous cases in the former area, although the cases are more numerous in the latter. This the author attributes to dirty and promiscuous habits favouring numerous infections, while in the cleaner Nyasaland people only those with low resistance develop a more severe type.

In South Africa a severe type is seen in Europeans, although the frequency of the disease is decreasing among them. Since the compulsory system has been modified to allow uninfective and recovered patients to be released good progress has been made. All contacts of admitted lepers are now examined regularly to detect early infections. The Emjanyana Leper Institution in the Transkei is now so popular that more than a third of the admissions are voluntary and the patients insist on compulsory treatment, with the result that 41 per cent. of the South African discharges in 1938 were from among the 29 per cent. of cases in this settlement. The number of cases in the South African institutions has only varied during the past twenty years from 2,265 to 2,374, but by June 1938, 4,502 cases had been discharged, but kept under observation for several years, and 2,738 had been released from such surveillance as having recovered. The South African Union spends between £40 and £50 on each of its segregated lepers and the author concludes that "there seems little doubt that if the present system is persisted with it will succeed in the end."

Basutoland also has a compulsory system of an expensive nature, a feature of which is the training of leprosy inspectors to search out the cases. Here again the measures are reported to be proving gradually effective.

In other British areas of Africa the financial position precludes compulsory segregation, but work in Nigeria especially shows that a great deal is being done at small expense through the co-operation of missions with the government. The Uzuakoli Leper Settlement has recently extended its work by establishing clinics in the surrounding villages, where sanitary measures are also taught, and leprosy relief work is being gradually extended over an ever widening area, and at a low cost with the help of the Native Administration and of the British Empire Leprosy Relief Association. Dr. Muir's African tours are doing much to improve the standards of work throughout the vast leprous areas of British Africa. *L. R.*

Basutoland: Annual Medical and Sanitary Report, 1938 [Dyke (H. W.), P.M.O.]. Appendix IV. pp. 50–56.—**Annual Report on the Leper Settlement at Botsabelo, Basutoland, for the Year ending 31st December, 1939** [Johnson (W. B.), Supt.].

The Annual Report of the Botsabelo Leper Settlement of Basutoland for 1938 shows an increase in the number of patients from 669 to 704 due to the work of two additional leprosy inspectors and a decrease of discharges and desertions. The small increase under these circumstances is regarded as a definitely encouraging feature. Early cases of 1 to 12 months' duration formed 38 per cent. of the admissions.

A recent medical board advised that a considerable number of the patients might be discharged without danger to the community, for some 14 per cent. are infirm " burnt out " cases. *L. R.*

MALDONADO ROMERO (Dario). La incidencia de la lepra en Colombia. [**Incidence of Leprosy in Colombia.**]—*Rev. Colombiana de Leprologia.* Bogota. 1939. Oct. Vol. 1. No. 3. pp. 186–189.

The number of lepers in Colombia is not known ; various guesses have been made from time to time and spoken of as " estimates " but the calculations were more than a little arbitrary. First came an obvious under-estimate from numbers reported to the sanitary authorities. Thus, Gabriel Castañeda in 1889–91 noted 2,325 cases of whom 740 were isolated ; Montoya and Florez in 1905–06 gave 4,304, of whom 1,658 were isolated. Secondly, multiplying, by a factor more or less arbitrarily chosen, the number of lepers in isolation ; some double this number, others choose 4 and pessimists elect to multiply by 8. Thirdly, estimate is made by comparing the general with the annual incidence [which seems begging the question, as the former is the sole point at issue]. The author quotes Professor SOUZA ARAUJO as taking the line that any patient unrecognized infects 6 persons in 20 years, and the average time of 7,897 isolated was just over 12 years before they were admitted, or about 95,000 " infective years " ; at the rate of 6 in 20 years this would give some 28,000 [the author gives this as 2,868, or only one-tenth of the true figure]. He concludes that in addition to those in isolation there are 1,729 "obscure" cases (cerrados inscritos) and 7,170 probable, or 16,796 in all. The figure of 7,170 as " probables " is based on the assumption that 2,868 [wrongly calculated, as stated above] is 40 per cent. of the total. During 1938 there were 1,062 registered cases. The 1938 census gave a population of 8,701,816 and on his calculations as given the incidence would be 1·92 per thousand ; a little over half (57·3 per cent.) are said to be registered. [This method would seem to be even more " arbitrary " than the others ; it is reviewed here because anything coming from Professor ARAUJO deserves serious consideration. It may be that the method needs further amplification.] *H. H. S.*

GEORGE (J. V.). Estudio sobre el foco leprogenico de Sotomayor. [**Sotomayor an Endemic Centre of Leprosy.**]—*Rev. Colombiana de Leprologia.* Bogota. 1939. Oct. Vol. 1. No. 3. pp. 196–202.

In the municipality of Sotomayor leprosy is endemic. Six sections of the town were investigated with populations varying from 105 in Pisanda to 1,079 in the Central. In the latter ten cases, were found, another twelve in Pangus among 834 inhabitants ; in all six sections lepers were found, 41 in the whole district among a population of 11,445, or 3·6 per mille. The cases are increasing in spite of efforts at isolation, and dietary deficiency is believed to be an important and contributory cause. *H. H. S.*

COCHRANE (Robert G.). **Recent Advances in Epidemiology, Diagnosis and Prevention of Leprosy.**—Reprinted from *Jl. Christian Med. Assoc. of India, Burma and Ceylon.* 1939. July. 17 pp. With 9 figs. on 5 plates. [54 refs.]

Marchoux (E.). La lèpre à la lumière de la pathologie comparée. [**Leprosy in the Light of Comparative Pathology.**]—*Rev. d'Immunologie.* Paris. 1939. Nov. Vol. 5. No. 6. pp. 523–534. [76 refs.]

In this paper the author discusses the light thrown by a study of rat leprosy on the pathology of the human form of the disease and comes to the following conclusions. Both diseases present characters in common, with identical morphology of the causative bacilli, neither of which has yet been cultivated with certainty. In both there is the same mode of transmission through contact. The leprosy bacillus is more dangerous than that of tuberculosis and is spread as easily, for as few as five bacilli well placed suffice to cause the disease. The incubation period, or at least the time required for the multiplication of the organisms is long, and resistance to the disease varies with the individual. The bacilli may remain indefinitely within one or more histiocytes, and some favourable influence may cause them to perish or disappear. Spontaneous cure occurs doubtless much more often than is thought to be the case when the infection is localized and the recipient is resistant to infection. *L. R.*

Cochrane (R. G.), Pandit (C. G.) & Menon (K. P.). **A Preliminary Note on Inoculation of Monkeys with Human Leprosy Material after Splenectomy.**—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 377–381.

The authors were led by the reports of Adler, that he had infected Syrian hamsters with lepra bacilli after removal of their spleens [this *Bulletin*, 1938, Vol. 35, p. 293], to try the same plan with monkeys. After the splenectomy subcutaneous nodules removed from leprosy patients were fixed to the splenic stump or omentum. Of the six animals that survived three were also reinoculated with leprous material and one of them " may be assumed to have been actually infected, but only one of the other two developed a small lesion at a distance from the abdominal incision, which subsequently healed as far as was evident at the time of reporting. In the other three the first inoculation was performed without splenectomy, and reinoculation was done later, together with splenectomy, and in one no infection was found two and a half months after the initial inoculation. The other two died three and five days respectively after the splenectomy ; one was completely negative and the other showed spread in the viscera. The results were therefore inconclusive, but reveal the possibility of individual resistance. *L. R.*

Burnet (Et.) & Jadfard (H.). Transmission de la lèpre humaine au hamster par voie digestive. [**Transmission of Leprosy Orally to the Hamster.**]—*Bull. Acad. Méd.* 1939. Nov. 7. Vol. 122. No. 31. pp. 383–388. With 3 figs.

The authors report apparently successful infection of a hamster by repeated feeding with leprosy material. Daily quantities of 2 cc. of skin and spleen very rich in lepra bacilli were administered orally for twelve days. Nine months later the animal appeared to be ill and death ensued two weeks later, when an autopsy was immediately carried out and minute granulations were found in the lungs, spleen, liver, kidneys and in small meso-peritoneal glands near the duodenum. Sections revealed large numbers of acid-fast bacilli, some in bundles as

seen in leprous lesions. Unfortunately by mistake the body of the animal was thrown away without inoculating animals to exclude tuberculosis. *L. R.*

MANALANG (J.). **The Morphology of *Mycobacterium leprae*: Third Report.**—*Jl. Philippine Islands Med. Assoc.* 1939. Aug. Vol. 19. No. 8. pp. 467–475.

This paper reports the results of a laborious investigation into the relative proportions of solid, segmented and granular forms of the leprosy bacillus in different types and stages of cases, with a view to determining if the segmented and granular forms are of a degenerative nature or rather processes of growth and proliferation. No less than 519 lesions in 257 patients were examined microscopically and the following conclusions arrived at. As the lesions advance the segmented and granular forms "taken together tend to decrease, while the percentage of supposedly retrograde changes taken together tend to increase." "In the previous report of readmitted relapsed cases the percentages of solid forms decreased and the percentages of granular forms increased in the skin lesions as these became more advanced and extensive (from C_1 to C_3). The finding in the present report as the lesions and the disease became advanced are not in accord with the previous observations. So far as the present observations are concerned, the interpretation of the granular forms of *My. leprae*, and the significance of the predominance of a certain form in a lesion, remain unsettled." *L. R.*

SARDJITO. Complementbindingsproeven met alcohol-, aether-, aceton-extract van zuurvaste bacillen en sera van leprapatiënten. [**Complement Fixation with Alcohol, Ether and Acetone Extracts of Acid-Fast Bacilli and Leprosy Sera.**]—*Acta Leidensia* (*Scholae Med. Tropicae*). 1939. Vol. 14. pp. 200–210.

Complement fixation tests with the cultures obtained from a gluteal abscess (Sidik bacillus) had indicated a closer relationship of this organism to the leprosy bacillus than to the tubercle bacillus [this *Bulletin*, 1937, Vol. 34, p. 911]. Further tests have now been applied to determine how far alcohol, ether or acetone extracts of the leprosy bacillus, the Sidik bacillus and the tubercle bacillus were related to one another. Details are given of the preparation of the several antigens. The sera of 18 cases of skin leprosy, 28 of nerve leprosy and 5 of mixed leprosy were used. As controls 10 tuberculous sera were employed, as also were normal sera. Where the extracts appeared to give positive reactions, it was the alcoholic extract which was superior to the other two. A number of tables of the experiments performed are set out, but the author himself replies in the negative to the question whether the tests had served to provide quantitative differences between leprosy, Sidik and tubercle bacilli. *W. F. Harvey.*

LIMA (J. P. Carvalho) & ARANTES (Maria). Cultura do bacilo da lepra. [**Cultivation of *Myco. leprae.***]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Dec. Vol. 7. No. 4. pp. 391–394. With 3 coloured figs. on 1 plate. English summary.

"We have tried cultivating, in modified Sauton's medium, *Mycobacterium leprae* from 36 clinically and bacteriologically verified cases of leprosy. In 30 cases there was an initial growth from the 4–6th day. In

4 cases, growth was variably belated and twice completely negative results ensued. In 3 cases, subcultures were possible during 5 months.

"Macroscopically, the growth presents pearl coloured clots with gray pigmentation and delicate veils on the surface. Successive microscopic examination brought to evidence different phases of the evolution of the organism thus supporting the opinion of those who admit a cycle in the evolution of *Mycobacterium leprae*.

"As it is, one is not able yet to reach a definite conclusion, but these results compel us to proceed with our experiments."

GAVRILOV (W.) & FESTER (A.), Mme. Le bacille de Stephansky et la culture de tissus des divers animaux de laboratoire. [**Rat Leprosy Bacillus Tissue Cultures.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 367–376. With 6 plates.

The authors report ten per cent. of successes during 4–6 months' trials of animal tissue culture media for the cultivation of Stéfansky's bacillus, which obtained access to the cells and for long preserved a normal appearance within them, especially in the tissues of the rat itself. Less success was obtained with the tissues of guineapigs and less still with fowl tissues. *L. R.*

GAVRILOV (W.), DUBOIS (A.) & FESTER, Mme. Influence de l'avitaminose sur l'infection des cobayes par le bacille de Stephansky. [**Avitaminosis in Rat Leprosy Infections of Guineapigs.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 361–366. With 3 plates.

The authors conclude from their experiments that an abnormal diet, especially a vitamin deficiency, may predispose to the infection of guineapigs injected with the rat leprosy bacillus. *L. R.*

GMINDER (Ernst). Vitamin B_1 und Lepra. [**Vitamin B_1 and Leprosy.**]—*Deut. Med. Woch.* 1939. Aug. 25. Vol. 65. No. 34. pp. 1346–1350. [32 refs.]

The author discusses the predisposing influence of avitaminosis, and refers to the occurrence of polyneuritis in both beriberi and in nerve leprosy. He records that the administration of betaxin in eight cases of generalized leprosy was followed by great improvement in one, improvement in five, a stationary condition in two with a return of the anaesthesia. The use of vitamin B_1 was sometimes followed by improvement in the sensory symptoms. He considers that deficiency of vitamins predisposes to leprosy infections. *L. R.*

MUIR (E.). **Resistance and the Typing of Leprosy Skin Lesions.**—*Leprosy Review.* 1939. Oct. Vol. 10. No. 4. pp. 221–225. With 1 fig.

This note again emphasizes the importance of the resisting powers of the patient on the development of leprous lesions. Natural resistance

is inborn in most subjects, but in perhaps one in ten it may be wanting, and it is low in children, as shown by the lepromin test. It does not appear to vary much in families or races. General resistance is in proportion to the general health. Acquired resistance may be systemic or local, and even in severe lepromatous cases the disease may subside and die out. The central healing of tuberculoid neural skin lesions is the result of local acquired immunity. *L. R.*

Fuertes (Federico) & Peruchena (José G.). Neuritis leprosa del cubital. [**Ulnar Neuritis in a Leper.**]—*Prensa Méd. Argentina.* 1939. Oct. 11. Vol. 26. No. 41. pp. 1995–2000. With 9 figs.

The patient was an Argentine farmer aged 40 years. In 1927, five years or so after he had been living with a fellow-workman who was a leper, he noticed pigmented, reddish, painless patches on his chest. When he came under the authors' observation in November 1938 he presented very extensive lesions—lepromata and infiltrations, and pigmented sites on limbs and trunk, anaesthetic areas on face and limbs, ulceration of legs, forearms, hands and fingers and perforation of the nasal cartilages. The ulnar nerves were enlarged as also were the lymphatic glands of neck, axillae and groins. The patient died in July 1939. The authors describe in detail the histological changes found in the ulnar nerves, noting that they involved all the elements—perineural, interfascicular, the nerve-fibres and the vessels—in all of which the bacilli were present in large numbers, with little or no evidence of defensive reaction. *H. H. S.*

Stein (A. A.). Zur Morphologie der Leprareaktion. II. Mitteilung. Histologische Veränderungen bei der II. Typus von Leprareaktionen. [**Morphology of the Lepra Reaction.**]—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 341–348. With 8 figs. on 2 plates. English summary.

This paper deals with the microscopical changes found during reactions in previously existing leprous lesions. The lepromatous granulomata with many bacilli were disturbed by the non-specific inflammatory condition, and suppuration occurred in three of the cases, with blister-like spaces under the unbroken epithelial layers. Extravasation of red cells and leucocytic infiltration, together with swelling of the connective tissue fibres were noted. The lumen of the blood vessels was filled with leucocytes and erythrocytes. Thus the inflammatory changes were of the "hyperergic" type, but extended to necrosis and suppuration with marked sensitization. *L. R.*

Ignacio Chala (J.). Reacción leprosa y sindrome eritema nudoso y E. polimorfo simultaneos con descamación eritrodermica generalizada. [**The Lepra Reaction with Erythema Nodosum and Erythema Multiforme and Generalized Desquamation.**]—*Rev. Faculdad de Med.* Bogotá. 1939. Nov. Vol. 8. No. 5. pp. 201–240. With 23 figs. & 3 charts. [22 refs.]

i. Lara (C. B.). **Mitsuda's Skin Reaction (Leprolin Test) in Young Children of Leprous Parents. I.—Observations on Children from One to Five Years Old.**—*Monthly Bull. Bureau of Health.* Manila. 1939. Jan. Vol. 19. No. 1. pp. 15–47. [18 refs.]

ii. Ignacio (José L.). **Observations on the Leprolin Test in Clinically Active, Bacteriologically Positive Lepers.**—*Ibid.* 1939. Feb. Vol. 19. No. 2. pp. 95–105.

iii. Lagrosa (Manuel). **The Leprolin (Mitsuda) Reaction in "Negative" Lepers : I.—Observations over a Period of One Year.**—*Ibid.* pp. 83–93.

These papers record an extensive series of tests on the diagnostic and prognostic value of Mitsuda's leprolin [lepromin] reaction carried out at the Culion leper settlement.

i. After reference to earlier work tests among a group of 66 children of leprous parents at three-monthly intervals for a year are reported. Their ages varied between one year and two months and four years and ten months, and they had all been in intimate contact with leper parents for from seven to seventeen months. Tables of the reactions in each test are recorded, followed by an analysis from which the following conclusions were reached. Of the children under two years of age 56 per cent. of the boys and 33 per cent. of the girls gave positive reactions, and of those over two years all the boys and 60 per cent. of the girls were positive. Three boys and two girls with recovered lesions and three boys and two girls with early ones were all positive. Within one year of the first test 58 per cent. of the boys and 50 per cent. of the girls previously free developed frank or definitely suspicious signs of leprosy ; in spite of which the leprolin test became positive or intensified. With very few exceptions the reactions became positive or intensified with repeated injections. The common diseases of children did not affect the degree of the reactions.

"The impression was therefore gained that the leprolin test is of no value as an index of the resistance of children over a year of age to the development of manifest leprosy, that it has no prophylactic value in such children ; and that there is a possibility that it may act provocatively, which should be further investigated."

ii. This paper deals with a year's investigation of three-monthly leprolin tests in a series of 111 cases bacteriologically negative. Males and females reacted alike, and the 20 per cent. of doubtful or negative results at the first test steadily diminished with later ones, and the degree of the reactions also became more marked. Among 41 cutaneous cases 39 per cent. were negative or doubtful at the first test, and the corresponding data were 16 per cent. in tuberculoid and 6 per cent. in neural cases. At the fourth test all forms gave positive reactions, although in the lepromatous ones this only occurred at the fourth test, but earlier in the other two forms, the tuberculoid being intermediate between the lepromatous and neural forms. Consistently positive reactions were met with in about 74 per cent. of the tuberculoid and 94 per cent. of the neural forms. With regard to relapses they were not seen in originally 3-plus reactions, but doubtful and positive reactions tended to become positive on repeated testing despite the occurrence of persistence of relapses. Of 13 patients with intercurrent pulmonary tuberculosis only one showed a slight weakening of the leprolin reaction, and pregnancy had little effect on the results. The work is being continued.

iii. In a similar manner this paper deals with repeated leprolin tests over a period of two years in 105 active bacteriologically positive cases, mostly cutaneous ones. At the first test 79 per cent. were negative, but at the fourth test 80 per cent. were positive. The reactions could not be correlated with the clinical changes as there was a progressive increase in the number of cases worse. The initial leprolin reaction however appears to have a limited prognostic significance. *L. R.*

MENDES (Ernesto) & GIL DE CASTRO CERQUEIRA. Estudos experimentais sobre a lepromina. [**Experimental Study of Lepromin.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Sept. Vol. 7. No. 3. pp. 245–293. English summary.

This article gives an account of the effects of varying doses of lepromin [leprolin] inoculated into non-lepers as well as the leprous and in different parts of the bodies of the latter, and compares the results of lepromin with those of tuberculin. The authors find that lepromin is made up of a filterable and a non-filterable constituent and it is the latter which is active in bringing about the lepromin reaction. With different preparations the results varied much, though the same degrees of dilution were employed; in other words, if comparable results are to be obtained, the lepromin used must be standardized. Again, the degree of reaction, *i.e.* the diameter of weal produced, varies also with the site of injection. Those with tuberculoid leprosy react to a less degree than the macular cases, and at the edge of the lesion there may be no reaction at all. Macular lesions may give a strong reaction, while in sites where the bacilli may be seen microscopically there may be absence of reaction. The authors regard the lepromin test as valuable in gauging local immunity. *H. H. S.*

WADE (H. W.). **"Leprolin" vs "Lepromin."**—*Internat. Jl. Leprosy.* Manila. 1939. Apr.–June. Vol. 7. No. 2. pp. 272–273.

In this short note Wade discusses the nomenclature of the preparation used in the Mitsuda test, pointing out that it consists of whole bacilli plus tissue elements and is therefore not similar to tuberculin. The term lepromin has the advantage of signifying the nature of the material of which it is made, namely leproma tissue, and should, in the author's opinion, be substituted for the less exact leprolin.

[In this number of the *Tropical Diseases Bulletin* both terms are employed as the authors have used them, but both apply to the same material, see LARA *et al.* and MENDES and GIL DE CASTRO CERQUEIRA above.] *C. W.*

RADNA (R.). Sur la réaction de Witebsky-Klingenstein-Kuhn dans la lèpre. [**Witebsky Reaction in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 407–412.

The author reports the results of this test in 133 lepers, 13 children of lepers and in a few syphilis and yaws patients and healthy controls. He obtained positive results in all the lepromatous cases, in 96 per cent. of neural, but in only 35·2 per cent. of tuberculoid ones, while in over 90 per cent. of the controls it was negative. He therefore regards the

test as of diagnostic value in neural cases in which bacteriological examinations may be negative. Positive reactions were also obtained in 3 of the 13 children of lepers. *L. R.*

RADNA (R.). Sur les réactions sérologiques syphilitiques chez les lépreux. [**Wassermann Test in Leprosy Cases.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 413–421.

A study of 153 leprosy and 61 non-leprosy cases indicated that positive results in leprosy cases usually became negative after anti-syphilitic treatment; the author therefore concludes that positive reactions are only contained when syphilitic complications requiring specific treatment are present. *L. R.*

SCHUJMAN (Salomon). "Un nuevo signo diferencial entre siringomielia y lepra nerviosa." [**A New Test to Differentiate Leprosy from Syringomyelia.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Dec. Vol. 7. No. 4. pp. 405–410. With 8 figs. (7 on 3 plates). English summary (9 lines).

In 1931 J. RODRIGUEZ and F. C. PLANTILLA described a test, denominated the *histamine test*, in which the local injection of a dilution of histamine into a site with intact nerves is followed in 10–15 seconds by a flush of 3–4 mm. diameter, spreading considerably in half a minute, and by a weal in 5 minutes or less. This is the sequence in a healthy subject or in one with intact peripheral nerves (and hence in syringomyelia, a disease where the cutaneous anaesthesia is of central origin). In leprosy of the macular-anaesthetic type where the nerves are involved, there is no such response.

[The author does not, either in the text or list of references, make any mention of RODRIGUEZ and PLANTILLA. Moreover, in these days of scientific advance a test 9 years old can hardly be described as "new." See also this *Bulletin*, 1932, Vol. 29, p. 268; 1933, Vol. 30, p. 560; 1935, Vol. 32, pp. 335, 858.] *H. H. S.*

DHARMENDRA. **Arneth Count in Leprosy.**—*Leprosy in India.* 1939. Oct. Vol. 11. No. 4. pp. 132–133.

In this note the author records the results of the Arneth count in 70 cases of leprosy. He confirms the finding of Sadi de Buen in 1916 that there is a shift to the left in this disease, and found no appreciable differences in the degree in nerve and lepromatous cases respectively. *L. R.*

DHARMENDRA & DE (N. K.). **Blood Cholesterol in Cases of Leprosy.**—*Leprosy in India.* 1939. July. Vol. 11. No. 3. pp. 93–97. [10 refs.]

RYRIE (Gordon A.) **Plantar Hyperalgesia and the Prognosis and Treatment of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 349–360. With 1 fig.

The author describes plantar hyperalgesia as an early sign of leprosy reactions and as of importance as a guide to prognosis and treatment. It is elicited by heavy stroking of the sole of the foot, after first ascertaining that tactile sensation is preserved, with a hard instrument

such as the wooden end of a pen, and considerable local pain occurs. This sign was found to be a very constant and early symptom during lepra reactions in lepromatous cases, either occurring naturally or induced by small doses of potassium iodide. It was also found in 52 per cent. of L1, in 43 per cent. of L2 and in 36 per cent. of L3 cases, but to be more severe during a reaction. Among 422 non-lepers it was only elicited in 2·6 per cent., all with some other lesions, such as inflamed ankle joints.

Further enquiries revealed that plantar hyperalgesia was associated with a higher erythrocyte sedimentation rate and a greater incidence of positive bacteriological findings in thick blood films than in cases with normal plantar sensation. Its presence would therefore appear to be an indication of progressive disease with a correspondingly bad prognosis, and one that is easily obtained without laboratory tests that may not be available. Its presence would therefore be an indication for not pushing treatment for fear of inducing undesirable reactions and *vice versa*. *L. R.*

GERMOND (R. C.). **The Differential Diagnosis of Circinate Tuberculoid Leprides and Polycyclic Syphilides.**—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 361–363.

This brief note records four cases presenting difficulties in diagnosis between circinate lesions in the two diseases. The distinctive features of the leproid conditions are stated to be that the rings are often interrupted, their surfaces finely or coarsely granulated and the black pigment of syphilides is absent. The crinkled tissue-paper appearance of tuberculoid leprides is also pathognomonic. *L. R.*

CAMPOS (Nelson Souza). Evolução rara de dois casos de lepra na infancia. (Lepra tuberculoide reaccional.) [**Reactional Tuberculoid Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Dec. Vol. 7. No. 4. pp. 395–403. With 20 figs. on 8 plates. English summary (8 lines).

"The author relates the observation of 2 cases of leprosy in children, 30 and 20 months old, with typical papuloid lesions, that underwent rapidly suppuration. He classified these cases among those of reactional tuberculoid leprosy, the evolution of which is towards spontaneous cure, since no treatment at all was used. The author concludes by discussing the benignity of certain forms of leprosy in infancy, mainly the lesions of tuberculoid nature, which always heal spontaneously, since they are not exposed to super-infection. The author calls attention to the cicatricial aspect of them."

i. RODRIGUEZ (J. N.) & WADE (H. W.). **The Status after Five Years of Neural Leprosy Cases studied in Cebu.**—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 309–326. With 24 figs. on 4 plates.

ii. WADE (H. W.) & RODRIGUEZ (J. N.). **Development of Major Tuberculoid Leprosy. A Report of Cases.**—*Ibid.* pp. 327–340. With 8 figs. on 2 plates & 2 text figs.

i. This is a detailed report on the progress of 52 neural leprosy cases during the course of five years, with illustrative photographs. These cases received little or no treatment during that period, so they

illustrate the natural course of fairly early and mild nerve leprosy. The results are summarized in the following table :—

TABLE 1.—*Changes in cases followed to* 1938, *with special reference to lesions biopsied.*

Lesion Group	Cases		Changes of Lesions			
	Original number	Number seen in 1938*a*	Residual or gone	Improved not residual	Stationary	Worse
Anesthesia only ...	3	3	3*b*	—	—	—
2. Residual, without atrophy	7	7	7*c*	—	—	—
3. Residual, with atrophy	6	5	5	—	—	—
4. Simple, quiescent ...	8	7	2*d*	1*e*	1	3
5. Simple, active	11	10	3	1	1	5
Papulate	9	8	7*f*	1*g*	—	—
Minor tuberculoid ...	4	4	1	—	1	2
Major tuberculoid ...	4	2	1	1	—	—
Totals ...	52	46	29	4	3	10

Not including cases followed for from one to three years.
Not considering purely neural changes.
In one instance (Case 4) the original lesion is gone but a slight new one present in 1938.
Two cases (Nos. 7 and 9) with aggravated polyneuritis.
Lesion removed entire in one case (No. 24).
New recent lesions have developed (Case 20).
Including Case 42, now with a new solitary lesion.
Case 44 ; only a little left, but not wholly inactive.

From this it will be seen that in 29 of the 46 cases re-examined after five years (only one of which had fairly regular treatment) the early lesions, some of which were single macules, were only residual or had disappeared, and 4 others had improved. Three were stationary and 10 were worse, but it is stated that still better results would probably have followed regular treatment.

ii. This is a detailed report on the evolution of two major tuberculoid leprosy cases. In the first case a five year quiescent period was followed by an obvious reaction with the appearance of numerous lepra bacilli in the lesions and new metastatic small papules. These did not expand further, but subsided to a residual stage in a year, when the patient was discharged on parole. The second patient also showed a reaction with positive bacteriological findings, followed by subsidence allowing of parole, but in this case a second reaction took place many months after apparent recovery. These cases show the importance of following up improved cases for long periods and the difficulties of prognosis in individual cases. *L. R.*

RISHI (D. P.). **A Review of Arrested Cases.**—*Leprosy in India.* 1939. Oct. Vol. 11. No. 4. pp. 124–127.

This note deals with 324 cases declared " symptom free " or " disease arrested " in the India Central Provinces Leper Institution at Chandkhuri in ten years to 1937. Of these 128 were children who were periodically re-examined and in whom relapses were seen in 13, or 10 per cent. Of the total cases 202 were recently re-examined, 22, or

10·89 per cent., had relapsed, but the rate was only 8·5 per cent. in neural against 18·0 per cent. in lepromatous cases. The chances of relapse beyond ten years of arrest appear to be small. *L. R.*

MUIR (E.). **Fungus Infections in Leprosy.**—*Leprosy Review.* 1939. Oct. Vol. 10. No. 4. pp. 206–208.

This note points out that Epidermophyton infections are troublesome complications of leprosy. They appear to be predisposed to by the loss of the sweating power, which is inimical to fungal growths. As PECK has suggested this may be counteracted by the application of acetic or lactic acid or fatty acids. The following prescription is advised. Pure carbolic acid 2 parts, ichthyol 2 parts, Tr. iodi. 2 parts, glycerine 4 parts and rectified spirits 4 parts; to be painted on the lesions and repeated after a few days if necessary. *L. R.*

LOWE (J.). **Leprosy and Tuberculosis.**—*Indian Med. Gaz.* 1939. Aug. Vol. 74. No. 8. pp. 482–487.

OBERDOERFFER (M. J.). **Pseudo-Raynaud's Disease in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 395–396. With 3 figs. on 1 plate.

PLUCHON (J. P.). Note sur un procédé de désacidification de l'huile de chaulmoogra injectable. [**Deacidification of Chaulmoogra Oils.**]—*Ann. de Méd. et de Pharm. Colon.* 1939. Jan.–Feb.–Mar. Vol. 37. No. 1. pp. 220–224. With 1 fig.

BEAUDIMENT (R.) & RIVOALEN (P.). La neutralisation des huiles de chaulmoogra.—*Ibid.* 1939. July–Aug.–Sept. Vol. 37. No. 3. pp. 750–763. [20 refs.]

The first of these papers is a technical one, which should be consulted in the original, on the methods of deacidifying chaulmoogra oils.

The second deals with the results obtained in treatment with such oils, which should show less than 6 per cent. of acidity for oral use, under 3 per cent. for intramuscular or hypodermic use and less than 0·8 per cent. for intravenous injection. Neutralization does not diminish the activity of the oil. The following is a simple way of obtaining a neutralized oil suitable for any method of administration. First add a small handful of desiccated sodium sulphate, shake and allow to stand for half a day before filtering. The oil is thus nearly freed from contained water. Then add a large excess of sodium carbonate and shake frequently during several days. After about twelve hours rest decant and filter through ordinary filter paper. The acidity is thus reduced to between 0·1 and 0·5 per cent. and the oil now keeps well. *L. R.*

DUBOIS (A.) & RESSELER (R.). Emulsion d'huile de chaulmoogra. Préparation. Tolérance par voie veineuse chez les animaux. [**Preparation of an Emulsion of Chaulmoogra Oil.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 355–360.

The authors have emulsified chaulmoogra oil with a solution of caustic potash according to the following formula: H_2O 10 cc., the oil 10 cc., glycerine 10 drops, KOH 2 per cent. 20 drops. Shake for

two or three hours. Microscopically the oil droplets ordinarily do not exceed 10–15μ but may reach 25–50μ on prolonged standing, so brief shaking is necessary before use. The emulsions are toxic for a small animal such as a rat in doses exceeding 0·5 cc. per kilo., but are well tolerated in the usual doses for man, and their use was received with favour by the indigenous patients. *L. R.*

Labernadie (V.). Les traitements de la lèpre de 1934 à 1938. [**The Therapy of Leprosy from 1934 to 1938.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. May & Nov. Nos. 5 & 9, pp. 569–580; 1149–1165. [173 refs.]

Burschkies (Karl). Ueber einige Ester der Chaulmoogra- und der Hydnocarpussäure sowie des Chaulmoogryl- und des Hydnocarpylalkohols, III. Mitteilung. [**Esters of Chaulmoogra and Hydnocarpus Acids and Alcohols.**]—Reprinted from *Berichte d. Deut. Chemischen Gesellschaft.* 1939. Vol. 72. No. 5. pp. 1012–1016.

Arnold (Herbert). Rhodanhaltige Derivate der Hydnokarpus- und der Chaulmoogra-säure. [**Sulphocyanide-containing Derivatives of Hydnocarpus and Chaulmoogra Acids.**]—Reprinted from *Arch. d. Pharm. u. Berichte d. Deut. Pharm. Gesellschaft.* 1939. 5 pp.

Vespoli (Miguel). As ulceras leprosas, pathogenia e tratamento pelas infiltrações intradermicas. Modo de ação geral e local dos preparados chaulmoogricos. [**Leprotic Ulcers, their Pathogeny and Treatment.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Sept. Vol. 7. No. 3. pp. 295–307. With 14 figs. on 7 plates.

The author does not furnish any fresh information regarding the pathogeny of ulcers in leprosy, but details his treatment and presents contrasting photographs of patients before and after the treatment which are very instructive. The details of his method are as follows :— The ulcer is well cleaned, and then with a syringe he injects a 4 per cent. creosoted ester of chaulmoogra oil in a double row 1 cm. apart of "percutaneous" insertions [presumably into the deeper layers of the skin], the inner row 0·5 cm. from the edge of the ulcer and the insertions 0·5 cm. apart. The ulcer is covered by gauze soaked in chaulmoogra oil heated to make it more fluid. This covering is renewed daily, and the infiltration fortnightly. The illustrations show an ulcer of the outer ankle, 8 cm. in diameter, healed in 22 days; another involving the outer half of the right dorsum of the foot and lower part of the leg healed in five weeks; others deeper, though smaller, took up to 54 days. *H. H. S.*

Sanjuán (Alfonso). La simpatectomia lumbar en el tratamiento de los perforantes plantares de la lepra. [**Lumbar Sympathectomy in the Treatment of Perforating Ulcers of Leprosy.**]—*Rev. Colombiana de Leprologia.* Bogota. 1939. Oct. Vol. 1. No. 3. pp. 151–158. With 3 figs.

RADNA (R.). Contribution au traitement de la lèpre : le traitement par injections endoveineuses et endodermiques de fortes doses d'huile de chaulmoogra et de ses dérivés. [**Intravenous and Intradermal Injections of Large Doses of Chaulmoogra Preparations.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 393–405.

The preparations reported on in this paper are for intravenous use a mixture of 7 parts of chaulmoogra oil and 3 parts of a 3 per cent. solution of gynocardate of soda according to the formula of Perrier, and for intradermal use chaulmoogra oil with 2 per cent. creosote. Neither induration of the veins nor general reactions occurred. A preparation called Graumanyl B was also used by both methods. Good results and relatively rapid improvement even in lepromatous cases were obtained. *L. R.*

NARAYAN (J. S.). **Neem Oil in the Treatment of Leprosy.**—*Leprosy in India.* 1939. Oct. Vol. 11. No. 4. pp. 128–131.

This Indian oil has previously been used in leprosy with variable results, but was given an adverse report by E. MUIR. The present author used it in sixteen cases by the intradermal and intramuscular methods and reports clinical improvement in six of the sixteen cases with a decrease in the number of lepra bacilli found in the lesions.

L. R.

IRVINE (Clive). **M. & B. 693 in Leprosy.** [Correspondence.]—*East African Med. Jl.* 1939. Sept. Vol. 16. No. 6. pp. 231–232.

In a letter the author records a trial of M. & B. 693 in twelve patients with negative results. All but one suffered from giddiness and headache after three grammes daily, and although the dosage was reduced to one-half all but two refused to continue the drug. *L. R.*

WHITCOMB (E. W.). **Rubrophene in the Treatment of Leprosy.**—*Leprosy in India.* 1939. July. Vol. 11. No. 3. pp. 98–100.

The extensive use in extrapulmonary tuberculosis of rubrophene (tri-methoxy-dioxy-oxotritane) led to its trial for three months intravenously in 78 leprosy patients with negative results as regards the symptoms of leprosy. A larger proportion than in a control series showed progress in their general health, but twice as many of the leprosy patients showed worse health after the new treatment.

L. R.

COCHRANE (R. G.), RAJ (M. Paul) & ROY (E.). **Treatment of Acute Lepra Reaction.**—*Leprosy in India.* 1939. July. Vol. 11. No. 3. pp. 74–81. With 5 figs.

Tartar emetic intravenously has for long been recognized as the most effective treatment of prolonged febrile reactions in the lepromatous type of leprosy. The authors report the successful use in this complication of the more convenient intramuscular injections of up to 2 cc. doses of the less toxic pentavalent antimony preparation [so in the text, but fouadin is a trivalent antimony preparation] known as fouadin, given every other day for six doses. If it fails then

tartar emetic should be used and its failure also is an indication to look for some other cause of the fever. The most typical features of the lepra reaction are fever resisting purges and sodium bicarbonate for more than three days, and exacerbation of the symptoms with the appearance of rose spot nodules in the skin. Notes and charts of illustrative cases are given. *L. R.*

International Journal of Leprosy. Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 403–410.—**Surgical Removal of Solitary Leprids.** [Correspondence.]

In view of occasional reports of the successful removal of solitary lesions of nerve leprosy in particular, correspondence was invited on the subject, as a result of which 19 cases are tabulated with the following results. No relapse in 12. Anaesthesia of scar only in two. New lesions appeared elsewhere in two, and three were not re-examined. It is pointed out that such slight lesions often yield readily to medical treatment. *L. R.*

Dharmendra & Chatterji (S. N.). **Total Excision of Early Neuro-Macular Lesions.**—*Leprosy in India.* 1939. Oct. Vol. 11. No. 4. pp. 117–123.

Of 22 cases 18 have been followed up after the excision of a single, and in one case two, early neural lesions of leprosy. In three there was local and in one general relapse. Of the 14 cases not relapsing nine have only been under observation for from 1 to 7 months and five for from 14 to 32 months, so it is too early to allow of definite conclusions, but the plan appears to be worthy of further trial. *L. R.*

Johansen (Frederick A.). **Fever Therapy in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 365–375.

This paper reports on 18 leprosy patients treated with a total of 164 fever treatments, induced by means of the Kettering hypertherm, with maintenance of the patients' temperature as a rule to 105°F. to 106°F., for five hours. In 15 of the 164 treatments complications necessitated its termination before the full time. In five cases after eight treatments a rest of seven weeks was given before a second series of six treatments, and after a further rest of six months six more treatments were given to four of the patients, so the trial was a thorough one. Another patient received two courses and the rest only one course of six treatments. The main complications observed were weak and rapid pulse in 12 and in one each, extreme exhaustion, excruciating pain in the lower back and convulsions respectively. Shock, temporary acute nephritis, tetany, restlessness and delirium were also observed. In 66 per cent. hyaline and granular casts, and in most of them also albumin, were present for a time. A temporary loss of an average of 4·4 pounds in weight was recorded. The results were very unsatisfactory, for of the 15 patients, 13 were worse after the treatment, 2 remained stationary, 1 has been discharged on parole, 1 died of pneumonia and 1 of cancer. The authors conclude that the progress of the cases continued uninterrupted by the treatment. *L. R.*

BERNAL LONDOÑO (Mario). **Review of Reenstierna's Cases.** [Correspondence.]—*Internat. Jl. Leprosy.* Manila. 1939. July–Sept. Vol. 7. No. 3. pp. 410–412.

LLERAS RESTREPO (Elvira). Preventorios infantiles. [**Leprosy Prevention for Infants.**]—*Rev. Colombiana de Leprologia.* Bogotá. 1939. Oct. Vol. 1. No. 3. pp. 149–150.

This brief article pleads for the establishment of preventoria in adequate number for the healthy children of lepers. The author states, whether as an estimate or a more accurate figure is not mentioned, that there are 2,000 healthy children in the leprosaria of Colombia. In October last year construction of a "preventorium" in the environs of Bogotá was begun; it is to maintain 150 children in three age-groups: (1) Those under 7 years who will be educated on a kindergarten system; (2) Those between 7 and 14 years, who will be instructed on primary school lines; and (3) Those from 14 to 18 years who will be trained for industrial or office work. If the 2,000 are to be dealt with many such institutions will be needed and the progress of this first, experimental, one will be watched with interest. *H. H. S.*

LEISHMANIASIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

Visceral leishmaniasis—SPEZIALE and BERGER (p. 345) report kala azar from Eritrea.

ALEKSEJEV and KONAKHOV (p. 345) find no evidence of multiplication of leishmania, other than by binary fission after the destruction of the macrophages which have engulfed them. He regards *L. donovani*, *L. infantum* and *L. tropica* as good species on epidemiological, but not on morphological grounds.

JOYEUX and SAUTET (p. 346) show that the dog louse *Linognathus setosus* is able to feed on man and that leishmania and flagellated forms are found in the intestine of these lice taken from dogs suffering from kala azar. The lice may possibly, therefore, act as vectors to man. YUAN *et al.* (p. 346) found that infection in children in N. China probably takes place chiefly between the middle of May and the middle of July. RISTORCELLI (p. 347) discusses *P. parroti*.

BOTZARIS (p. 347) has investigated the blood changes in infantile kala azar. GATTO (p. 347) shows that the Sanarelli-Shwartzman phenomenon may be produced in animals by using a filtrate of a culture of *L. donovani* for the intradermal and intravenous injections, and considers that this reaction may form the basis of the haemorrhages at times observed in visceral leishmaniasis. MURANO and VECCHIO (p. 348) show that the production of bacterial antibodies in animals with blocked reticulo-endothelial system, or in children with leishmaniasis, is increased over the normal, and attribute this to the hyperplasia of the histioid cells in these conditions, but DHAR (p. 348) refers to the seriousness of pneumonia in patients also suffering from kala azar, and suggests as a reason the loading of the reticulo-endothelial system with parasites.

MATTEI *et al.* (p. 349) report kala azar in two adults in Corsica, an unusual finding though the infantile form is fairly common;

diagnosis was made by serological tests and sternal puncture. The authors consider that the dog is a reservoir and that the dog tick is the vector.

Napier (p. 349) states that spleen puncture gives the greatest proportion of positive results, and discusses the serological tests. Reddy and Subramaniam (p. 349) prefer spleen puncture to sternal puncture in diagnosis, though the latter is safer.

Rogers (p. 350) traces the development of the antimony treatment of kala azar and states that treatment of all cases in villages in India is followed in a few years by disappearance of the disease. Neostibosan, however, is expensive, but with a cheap drug and sufficient staff kala azar could be greatly reduced in India. Vecchio (p. 350) found a transient phase of blood deterioration soon after the commencement of tartar emetic treatment in the kala azar of children, which soon passed off.

Muco-cutaneous leishmaniasis.—Rames (p. 351) reports oriental sore from the Southern Oranais district of Algeria, and Guignon (p. 351) a case from the Algerian littoral.

Dubovskoj (p. 351) describes the growth of *L. tropica* on Bilnchi's milk medium. Senekji (p. 351) refers to the standardization of suspensions of leishmania by means of standard opacity tubes, and details the biochemical reactions of *L. tropica*.

In the Abruzzi, Vanni (p. 352) found one *P. macedonicus* of 1,600 wild sandflies to be infected, using the method of serial sections, in a building the inhabitants of which showed oriental sore. Infection was also present in a group of 200 other sandflies ground up and injected into rats.

Villela (p. 352) describes mucosal leishmaniasis in São Paulo, pointing out that nasal lesions may be the first to develop. Sandflies are not known to be capable of feeding inside the nose and it is possible that these nasal lesions may in fact be secondary to undetected skin infections. Villela *et al.* (p. 353) found leishmania in scrapings from the apparently normal nasal mucosa of persons with cutaneous leishmaniasis in Brazil. Treatment of patients with cutaneous lesions only should therefore not be confined to arsphenamine but should include intravenous antimonials, which can destroy parasites in the nasal mucosa. *C. W.*

Speziale (Vittorio) & Berger (Renato). Leishmaniosi viscerale in adulto proveniente dall'Eritrea. [**Kala Azar in an Adult from Eritrea.**]—*Ann. di Med. Nav. e Colon.* 1939. July–Aug. Vol. 45. No. 7–8. pp. 332–338. With 3 figs.

The case recorded is that of a young man 25 years of age who contracted kala azar in the endemic focus in Eritrea.

C. M. Wenyon.

Aleksejev (A. G.) [=Alexeieff] & Konakhov (A. G.). Sur la morphologie et le cycle évolutif de la *Leishmania infantum*. [**Morphology and Life-Cycle of** *L. infantum*.]—*Med. Parasit. & Parasitic. Dis.* Moscow. 1939. Vol. 8. No. 3. [In Russian pp. 331–338. With 2 figs.]

This paper contains observations on some points of the cytology and development of leishmania in the human host. Reference is

made to the presence in the cytoplasm of certain individuals (4 to 8 per cent.) of an azurophile granule regarded as a metachromatic granule [=volutin] and said to be a constant inclusion, since in the course of binary division of the parasite it likewise undergoes fission.

The authors further discuss the question regarding schizogony in leishmania—a notion which has recently come to the fore again—and conclude, on the basis of their own observations, that there is no evidence of any other form of multiplication than binary fission. They could discover no signs of division in the leishmania enclosed in macrophages, but found indications that many of the parasites were undergoing phagocytosis. In view of this they believe that the macrophages do not constitute a favourable medium for the development of the parasite, which multiplies only after the host-cell is destroyed. Though admitting the morphological identity of *L. donovani*, *L. infantum* and *L. tropica*, the authors regard them as "good species" on epidemiological grounds. [This argument, however, is not in accordance with the principles of zoological classification.] *C. A. Hoare.*

JOYEUX (Ch.) & SAUTET (J.). Le pou du chien : *Linognathus setosus* (Olfer, 1816) peut éventuellement piquer l'homme. Rôle vecteur éventuel de cet insecte. [**Ability of the Dog Louse to bite Man ; its Possible Rôle as Vector.**]—*Arch. Méd. Gén. et Colon.* 1939. Vol. 8. No. 3. pp. 73–76.

Having shown that the dog louse (*Linognathus setosus*) taken off dogs suffering from kala azar and harbouring leishmania in the skin is liable to have leishmania and the flagellate forms of these in the intestine, the author raises the question of the possibility of this insect being a vector of the disease. The present paper records experiments to test the capacity of the dog louse to bite human beings. It was found that it was able to do so, that its bite was attended by little or no irritation during or after it was inflicted and that it sucked blood slowly during as long as one hour. It therefore seems possible that the dog louse either by its bite, dejecta or body fluids when crushed might, under certain conditions, be able to bring about the transmission of kala azar. *C. M. Wenyon.*

YUAN (I. C.), CHU (F. T.) & LEE (C. U.). **The Seasonal Incidence of Kala-Azar in Infants and its Significance in Relation to the Transmission Problem of the Disease.**—*Chinese Med. Jl.* 1939. Sept. Vol. 56. No. 3. pp. 241–264. With 1 graph. [12 refs.]

Data regarding 36 children under one year of age who were diagnosed as suffering from kala azar in N. China were carefully analysed with a view to determining the time when infection must have occurred. It appears that with the exception of one case infection took place in the early summer months, probably between the middle of May and the middle of July. This corresponds with the period of greatest incidence of *Phlebotomus chinensis*, specimens of which were found naturally infected during June and July in kala azar houses. One child, born in September, was 5·5 months old when the disease was diagnosed but it can be assumed that infection occurred soon after birth at the end of the sandfly season. The results obtained do not lend support to any theory of transmission which does not take into account a period of greatest infectivity. The paper contains a number

of tables and charts giving the data on which the conclusions are based and abstracts of the case histories of the children involved.

C. M. W.

Colas-Belcour (J.) & Romaña (C.). Présence de *Phlebotomus perniciosus* en Seine-et-Marne. [*P. perniciosus* **in Seine-et-Marne.**]—*Bull. Soc. Path. Exot.* 1939. Dec. 13. Vol. 32. No. 10. p. 901.

Ristorcelli (A.). Sur les phlebotomes de l'Île de Crète. [**Sandflies of the Isle of Crete.**]—*Ann. Parasit. Humaine et Comparée.* 1939. July 1. Vol. 17. No. 4. pp. 355–358. With 1 fig.

The author reports a collection of 138 sandflies from Canea, Crete. Of the eight species known to occur in this locality four were represented in the collection. Having had the occasion to examine a specimen of the supposed *Phlebotomus parroti* var. *italicus* taken in Herakleion the author concludes that the characters of *P. parroti* itself are so variable that there is no need to recognize the sub-species *italicus*.

C. M. W.

Parrot (L.) & Martin (R.). Notes sur les phlébotomes, XXX.—Une variété nouvelle de *Phlebotomus sergenti*, d'Ethiopie. [**A New Variety of** *P. sergenti* **in Ethiopia.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Sept. Vol. 17. No. 3. pp. 484–489. With 6 figs. [10 refs.]

Martin (Raymond). Observations sur les Phlébotomes d'Éthiopie. (Deuxième mémoire.) [**The Phlebotomus of Ethiopia.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Sept. Vol. 17. No. 3. pp. 490–501.

Botzaris (A.). Beitrag zur Hämatocytologie der "Leishmaniosis infantum" in Griechenland bei 30 Fällen. (Mit einigen Angaben der Symptomatologie.) [**Haematocytology of 30 Cases of Infantile Kala Azar in Greece, with Some Notes on Symptomatology.**]—*Folia Haematologica.* 1939. Vol. 62. No. 2/3. pp. 215–224. [31 refs.]

The author has studied in Greece a series of 30 cases of infantile kala azar from the point of view of the changes which are to be observed in the blood. He has noted the usual anaemia and leukopenia with lymphocytosis and has set out in tabular form the various cells observed and their percentages. Certain observations were also made on the character of the fever and other symptoms. Those interested in the blood changes in this disease will find in the paper much detailed information.

C. M. W.

Gatto (Ignazio). Ricerche e considerazioni sul fenomeno di Sanarelli-Shwartzman provocato con la *Leishmania donovani*. [**The Sanarelli-Shwartzman Phenomenon provoked with** *L. donovani*.]—*Giorn. di Batteriol. e Immunol.* 1939. Sept. Vol. 23. No. 3. pp. 418–429. [29 refs.] English summary (9 lines).

In 1914 Sanarelli showed that the intravenous injection of small quantities of the filtrate of a broth culture of *Bacterium coli* and *Proteus vulgaris* into rabbits which 24 hours before had received intravenously a non-fatal dose of cholera vibrios was followed frequently

by a violent crisis characterized by vaso-dilatation of the abdominal vessels and death. In 1928 SHWARTZMAN observed that if an intravenous injection of a bacterial filtrate was given to a rabbit 20–48 hours after a small quantity of the same filtrate had been injected into the skin there might develop an haemorrhagic response followed by necrosis at the site of the skin inoculation. The two phenomena are regarded as identical, the reaction being termed the Sanarelli-Shwartzmann, or simply the S.S., phenomenon. In the present paper the author shows that the reaction may occur when an injection of a filtrate of a culture of *Leishmania donovani* or an autolysate of the flagellates into the skin is followed later by an intravenous injection of a filtrate of *Bact. coli* or of the filtrate or autolysate used for the skin injection. It is thought that this reaction affords an explanation of the haemorrhages which are at times observed in cases of visceral leishmaniasis. *C. M. W.*

MURANO (Giulio) & VECCHIO (Federico). Sull'interessamento del sistema reticolo-istiocitario nella leishmaniosi interna. 2. La produzione degli anticorpi agglutinanti nella leishmaniosi interna. [**Relation of the Reticulo-Endothelial System to Kala Azar. 2. Production of Agglutinating Antibodies in Kala Azar.**]—*Pediatria.* 1939. Oct. Vol. 47. No. 10. pp. 861–877. [31 refs.]

The authors discuss the views which have been expressed regarding the part played by the reticulo-endothelial system in the production of antibodies. As there appeared to be no agreement about this they carried out a series of experiments designed to throw light on the problem. The serological response of normal rabbits to the injection of bacterial vaccines (typhoid and para-typhoid) was compared with that of rabbits in which the reticulo-endothelial system had been blocked. In all cases there was a better production of antibodies in the animals with a blocked reticulo-endothelial system. These observations were extended to children suffering from kala azar in which it can be presumed that an hypertrophied reticulo-endothelial system is blocked with leishmania. Here again there was a superior response to that which was observed in normal children. These results, according to the authors, support the view that immune bodies are products of the cells of the reticulo-endothelial system and that they are increased in leishmaniasis because of the "hypertrophy and hyperplasia of the histioid cells of that system." [See also this *Bulletin*, 1939, Vol. 36, p. 1029.] *C. M. W.*

DHAR (D. R.). **Bearing of Enlarged Spleen, mostly of Kala-Azar, on Pneumonias.**—*Trans. Med. College Re-Union.* Calcutta. 1938–39. Vol. 2. pp. 62–64.

In a fairly large experience of pneumonia the author has found that the occurrence of this disease in subjects already suffering from enlargement of the spleen and liver, chiefly as a result of kala azar, is much more serious than when it attacks a healthy person. In the case of kala azar at least the author concludes that the protective mechanism of the host is hindered by the loading of the reticulo-endothelial cells with parasites. Even if such cases recover from one attack they are very liable to another. On the other hand recovery may be followed by retrogression of the primary disease. In all such cases it is important to treat the underlying condition. *C. M. W.*

Mattei (Charles), Giraud (Paul), Dumon (G.) & Dumon-Lenègre, Mme. Un nouveau cas de leishmaniose viscérale de l'adulte d'origine corse. [**A Fresh Case of Kala Azar in the Adult from Corsica.**]—*Bull et Mém. Soc. Méd. Hôpit. de Paris.* 1939. Dec. 1. 55th Year. 3rd Ser. No. 26. pp. 1299–1304.

The case reported is that of a woman 27 years of age who, living in Corsica, contracted a disease characterized by splenomegaly, anaemia and continuous fever. The diagnosis was obscured by the report of a discovery of malarial parasites in the blood. A failure to respond to quinine treatment led to a further investigation of the case. Kala azar being suspected, serological tests were carried out. These being positive, a sternal puncture was performed, with the result that numerous leishmania were found. A cure was effected by means of neostibosan. Though kala azar is fairly common in children in Corsica, it is so rarely encountered in adults that a diagnosis in the case reported was not made for some time. The occurrence of a second case at the time of presentation of this paper suggests to the authors that adults in Corsica may be infected more commonly than is at present suspected. The village from which the first patient came was known to be an endemic focus of infantile and canine kala azar. The dog belonging to the patient suffered from a cutaneous condition which the doctor had diagnosed as due to leishmaniasis, while the patient herself stated that she had been bitten by a tick. The authors maintain that these facts support their contention that the dog is a reservoir and the tick the vector of the disease. *C. M. W.*

Napier (L. Everard). **The Diagnosis of Kala-Azar in Dispensary Practice.**—*Indian Med. Gaz.* 1939. Oct. Vol. 74. No. 10. pp. 600–602. With 2 plates (1 coloured).

This article comprises a series of notes indicating the procedures to be adopted for the laboratory diagnosis of kala azar in dispensary practice. It is illustrated by two plates showing the negative and positive aldehyde and antimony tests for the disease. The various procedures for the discovery of parasites—blood film examination, spleen and sternal punctures—are reviewed and it is shown that spleen puncture gives the greatest percentage of positive results. Culture methods are only possible when a well equipped laboratory is available. Of the two serological tests the antimony test will often give a positive result at an earlier date than the aldehyde test, but when the spleen is markedly enlarged a positive diagnosis cannot be made with safety on the result of the antimony test. In such cases the aldehyde test should be carried out. When these tests both give a doubtful result attempts should be made to discover the parasites. If none is found then the case is regarded as "pending," a further serological test being made in a month's time. If there has been no advance in the direction of a definite positive result the case is probably not one of kala azar.

C. M. W.

Reddy (D. Govinda) & Subramaniam (R.). **Sternal Puncture in Kala-Azar.**—*Indian Med. Gaz.* 1939. Nov. Vol. 74. No. 11. pp. 664–665.

It is reported that in two cases of kala azar diagnosed by spleen puncture sternal puncture had failed to reveal leishmania. Sternal

puncture is said to be time consuming and tedious though it requires less preparation and after-care than spleen puncture and, moreover, is safer. It is clear that a negative sternal puncture does not exclude a diagnosis of kala azar. *C. M. W.*

ROGERS (Leonard). **The Antimony Treatment of Kala-Azar.**—*Nature.* 1939. Dec. 16. Vol. 144. No. 3659. pp. 1003–1004.

In this note the author traces the history of the discovery of the cause of kala azar and its treatment. The tartar emetic remedy introduced with such good results by CHRISTINA and CARONIA in Sicily and by the author in India was replaced by the pentavalent compound ureastibamine originated by BRAMACHARI. Although this substance was less toxic than tartar emetic it was of uncertain composition and varied in its antimony content. Then a series of more definite compounds was introduced in Germany, culminating in neostibosan for intravenous and solustibosan for intramuscular injection. With these a cure rate of over 90 per cent. can be expected.

It has been shown by NAPIER that the treatment of all cases in Bengal villages with neostibosan has been followed in a few years by the disappearance of the disease. A similar result was obtained by the treatment by the Assam Government, chiefly with ureastibamine, of over 300,000 cases between 1923 and 1935. Unfortunately the cost of treatment for the poor villagers in India is prohibitive, NAPIER, in 1925, finding that the price of sufficient drug for a single case was about £3. It is evident, the author states, that with a cheap drug and sufficient medical staff kala azar in India would be reduced to small proportions. *C. M. W.*

SAXENA (G. S.). **Some Interesting Facts about a Case of Kala Azar.**—*Jl. Indian Med. Assoc.* 1939. May. Vol. 8. No. 8. pp. 480–481.

The report of a case in Patna presumed to be kala azar on clinical grounds alone and after a failure to respond to quinine and atebrin therapy. A cure followed the administration of neostibosan and stiburamin (B.C.P.W.) *C. M. W.*

VECCHIO (Federico). Indici ematologici del meccanismo di azione del tartaro stibiato nella cura della leishmaniosi interna. [**Haematological Signs of the Mechanism of the Action of Tartar Emetic in the Treatment of Kala Azar.**]—*Pediatria.* 1939. Dec. Vol. 47. No. 12. pp. 1026–1039. [27 refs.]

The paper describes the results of an investigation into the changes which took place in the blood during the treatment with tartar emetic of six cases of kala azar in children from 9 months to 6 years of age. It was found that as a rule there was a transient negative phase, during which the blood condition deteriorated, soon after the commencement of treatment. This was shown by increase in the lymphocytosis and a decrease in the number of neutrophile leucocytes and red blood corpuscles. At the same time the bilirubinaemia became more marked, while the reticulocyte count was greater. These changes, which quickly passed off, are attributed by the author to a temporary exaggeration of the condition of hypertrophy of the reticulo-endothelial system. It was noted that when the leishmanial infection was not a heavy one the negative phase might not be apparent. *C. M. W.*

Rames (C.). Sur l'existence du bouton d'Orient à Beni Abbès (Sahara Oranais). [**Existence of Oriental Sore at Beni Abbès.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Sept. Vol. 17. No. 3. pp. 482–483. With 1 plate.

The detection of a case of oriental sore in a native boy 4 years of age at Beni Abbès extends the area in which the disease occurs in the Southern Oranais district of Algeria. *C. M. W.*

Guigon (G.). Nouveau cas de bouton d'Orient sur le littoral algérien. [**Fresh Case of Oriental Sore on the Algerian Littoral.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Sept. Vol. 17. No. 3. p. 481. With 1 plate.

The case reported is that of a woman aged 28 who contracted oriental sore on the right cheek. She had always lived in the Philippeville district, her home being at Place Jeanne d'Arc. *C. M. W.*

Dubovskoj (P. A.). Le milieu lacté pour la culture des leishmanies. [**Milk Culture Medium for Leishmania.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1939. Vol. 8. No. 3. [In Russian pp. 339–340. French summary p. 340.]

Cultures of *L. tropica* isolated directly from human sores were grown successfully in a medium devised by Bianchi and made up as follows. Cow's milk is first freed of fat by passing it through the separator and filtering through linen, after which it is distributed into sterile test-tubes (6–8 cc. in each), and sterilized in a Koch sterilizer for 20 minutes daily three days in succession. To each tube is then added 0·75–1 cc. defibrinated rabbit blood. The cultures—incubated at 20–22°C.—show abundant growth by the fifth or sixth day, and can be kept without subinoculation for over 2 months. *C. A. Hoare.*

i. Senekji (H. A.). **Standardization of *Leishmania tropica* Suspension with Brown's Standard Opacity Tubes.**—*Amer. Jl. Trop. Med.* 1939. Nov. Vol. 19. No. 6. pp. 599–600.

ii. ——. **Biochemical Reactions of *Leishmania tropica*.**—*Ibid.* pp. 601–604.

i. In the first of these papers the author describes the standardization of saline suspensions of culture forms of leishmania from the surface of solid media by means of Brown's opacity tubes (Burroughs Wellcome & Co.). He has established that tubes No. 1 to No. 10 represent concentrations of twenty and a half million organisms per cc. up to one hundred and twenty-one million per cc.

ii. In the second paper the biochemical culture reactions of *Leishmania tropica* are noted. These are :—

1. No production of acid or gas from carbohydrates
2. No liquefaction of gelatin
3. Methyl red reaction negative
4. Voges Proskauer reaction negative

5. Peptonization of milk
6. Bile soluble
7. No production of indole.

The various media employed for these tests are enumerated.

C. M. W.

VANNI (Vittorio). Osservazioni e ricerche sperimentali in una endemia di leishmaniosi cutanea. [**Researches on an Endemic of Oriental Sore.**]—*R. Accad. d'Italia. Mem. d. Classe di Sci. Fisiche, Mat. e Nat.* 1939. Vol. 10. Extract No. 3. pp. 87–104. With 3 text figs. & 22 figs. on 12 plates. [12 refs.]

The paper is an amplification of one previously published by the author [this *Bulletin*, 1939, Vol. 36, p. 1034]. He describes in detail the type of infection and the character of the leptomonad flagellates found by him in one of 200 specimens of wild *Phlebotomus macedonicus* captured by him in Roseto in a building the upper part of which was occupied by a family some of the children of which had actual oriental sores on the face while others had the scars of healed sores. It seemed clear that the flagellates were developmental forms of leishmania. In all, 1,600 wild sandflies were examined by the method of serial section but the example mentioned above was the only instance of a natural infection. Two hundred other specimens collected in the same building were ground up in saline solution and the resulting emulsion inoculated into the root of the tail of three rats. After 40 days one of the rats showed a red swelling at the site of inoculation and in it leishmania were found, proving that at least one of the 200 sandflies was naturally infected. It seems clear to the author that this sandfly is the vector of oriental sore in the Abruzzi district of Italy. By inoculation of parasites from an oriental sore into the skin of a hamster (*Cricetus cricetus*) a lesion containing leishmania was produced. *C. M. W.*

VILLELA (Francisco). Dados estatisticos sobre a leishmaniose das mucosas em Araçatuba, S. Paulo. [**Statistical Data on Mucosal Leishmaniasis in Araçatuba, S. Paulo.**]—*Folha Med.* 1939. May 25. Vol. 20. No. 15. pp. 243–244.

During the 22 years preceding the end of 1935 there were seen at a clinic in São Paulo 1,791 cases of mucosal leishmaniasis. The disease was about nine times as common in men as in women and chiefly in individuals over 16 years of age. Of a series of 187 cases the infection was limited to the nasal mucosa in 146. The other cases had lesions of the buccal, pharyngeal, laryngeal or other mucosal surfaces of the mouth. In many of these cases evidence was obtained of previous cutaneous lesions but this was not always possible as the nasal infection may manifest itself some years after the skin lesions have healed. In five of the cases in which cutaneous sores were present as well as the nasal lesions the patients declared that the nasal condition was the first to develop. If the nasal infection was actually the primary one it would have to be assumed that the sandfly was capable of feeding inside the nose, a habit which has so far never been recorded. On the other hand it might be that there was some latent undetected skin infection and that parasites had been conveyed to the nasal mucosa by way of the blood or lymph. Such a latent skin infection might only

become apparent as a lesion after the nasal condition had developed. Where a definite cutaneous sore exists parasites might readily be inoculated mechanically on to the nasal mucosa. *C. M. W.*

Villela (F.), Pestana (Bruno R.) & Pessoa (S. B.). Presença da " Leishmania brasiliensis " na mucosa nasal sem lesão aparente, em casos recentes de leishmaniose cutânea. [**Presence of *L. brasiliensis* in the Nasal Mucosa without Apparent Lesions, in Recent Cases of Cutaneous Leishmaniasis.**]—*Hospital.* Rio de Janeiro. 1939. Dec. Vol. 16. No. 6 pp. 953–960. With 1 fig.

Twelve cases of cutaneous leishmaniasis in Brazil which exhibited no evident lesions of the nasal mucosa were carefully studied from the point of view of initial lesions in the nose. In five cases small initial lesions were detected in the nose but in only one of them were leishmania found. In the remaining seven cases the nasal mucosa appeared normal but nevertheless scrapings from the mucosa were made and in films of the exuding blood leishmania were found in four. The parasites were in some of the cases quite numerous. It seems clear that this deposit of parasites in the nasal mucosa would lead in many cases to the characteristic muco-cutaneous disease. Moreover the nasal lesions in certain cases appear after the cutaneous condition has been subject to treatment with eparseno (arsphenamine solution ready for injection) which does not eradicate the nasal infection. On this account treatment of cases which show only cutaneous lesions should be the administration of eparseno combined with intravenous antimonials which are capable of destroying parasites in the nasal mucosa. *C. M. W.*

MALARIA.

Précis of Abstracts in this Section.

Marneffe *et al.* (p. 355) show that in the Tonking delta malaria is relatively mild but subject to seasonal epidemic outbursts during which *P. falciparum* is found as often as the otherwise more common *P. vivax*. *A. hyrcanus* var. *sinensis* is very prevalent and is the principal vector, here being anthropophilic.

Faust (p. 356) shows that malaria is spreading to the west from the two previously existing zones of the southern United States. Giglioli (p. 356) incriminates *A. darlingi* as the only important vector in British Guiana. In plantations with low, medium or high spleen rates the ratio of births to deaths progressively diminishes and the infant mortality progressively increases. Kumm and Ruiz (p. 357) describe the endemic malaria of Costa Rica, most prevalent in the low-lying coastland. *A. albimanus* appears to be the only vector.

Piccaluga (p. 358) has investigated the gametocyte rates of the inhabitants of a town in Sardinia.

In uninfected Italians coming to an endemic area in Abyssinia Corradetti (p. 358) observes that at first *P. falciparum* infection is the most frequent but that the incidence of *P. vivax* infection increases as time goes on. He (p. 358) gives an account of the anophelines of the Uollo Jeggiu region of Italian East Africa.

Russell and Mohan (p. 359) have investigated the effects of different larval environments on the growth of *A. stephensi* and its susceptibility to infection with *P. falciparum*. They (p. 359) find the type form and the *mysorensis* variety of *A. stephensi* to be easily infected with *P. falciparum*.

Stone and Reynolds (p. 360) consider that eggs of *A. albimanus* and other anophelines in Panama may hibernate through the dry season in earth moistened by seepage and protected against subsequent drying by leaves or grass. Vargas (p. 360) discusses anophelism without malaria in Mexico.

Vryonis (p. 360) shows that in *P. vivax* infection reticulocytes are infected much more frequently than mature erythrocytes, and attributes this to the relative stickiness of the reticulocytes. In the early stages of the infection there is a transient increase in the number of reticulocytes with each attack of fever. Greig and Neil (p. 361) found that in malaria the administration of quinine or plasmoquine co. is followed by an increase in the number of reticulocytes. This does not occur in normal persons and it appears that in malaria quinine produces haemolysis followed by erythropoiesis, and this finding supports the view that quinine may provoke blackwater fever. At the same time there is a fall in haemoglobin, and an increase in the blood sedimentation rate occurs in the course of the infection, returning gradually to normal after the administration of specific drugs.

Lesné *et al.* (p. 362) report *P. malariae* infection transmitted by blood transfusion from a man who had been away from malarious countries for 13 years. A similar case is reported by Nabarro and Edward (p. 362) ; the donor had left Ceylon 12 years previously and lived in England. The conclusion is that persons who have had malaria or who have lived in malarious countries are not suitable as blood donors, especially to children.

González Barreras (p. 362) reports favourably on prontosil in treatment. Young and McLendon (p. 362) show that neither mapharsen nor tryparsamide eliminate *P. malariae* from the blood although they relieve symptoms.

Casini (p. 363) found no benefit from intravenous adrenalin treatment in a series of cases of malarial splenomegaly compared with a group of controls in Sardinia, either in the number of attacks, the size of the spleens or the improvement of the blood or general condition. Marotta (p. 363) similarly states his opinion that adrenalin has no action in malaria. It does not shorten the disease or prevent relapses, nor does it reinforce the action of quinine or improve the general condition. Pizillo (p. 364) on the other hand, a convinced believer in the Ascoli treatment, reports success in the treatment of nervous syndromes in malaria by this method.

Ahmed (p. 364) describes the good results obtained by anti-malarial measures in a railway settlement. O'Neill (p. 364) gives particulars of the construction of concrete lined ditches for mosquito control. Kubo and Ohito (p. 365) describe a new larvicide oil. Syddiq (p. 365) describes the method of applying Paris green by using mud balls containing 2 per cent. of the powder. These are added to water not more than 5 feet deep, and the Paris green is liberated.

Schilling (p. 366) states that it is possible to inject about 100 schizonts or sporozoites of *P. vivax* in man without producing infection, and that therefore man has a fundamental resistance to malaria not based on premunition. Increased resistance can be obtained by

repeated small inoculations but resistance to schizonts does not protect against sporozoites and if sporozoites are injected the immunizing results are very small. The receptivity of the individual is an important factor. Experimental results are quoted and the object of the work is to explore the possibility of protective vaccination.

Malaria of Birds and Monkeys.—Giovannola (p. 367) has given an account of the bird malaria parasites, suggesting that the Plasmodiidae and the Haemoproteidae should be regarded as one family, a suggestion criticized by Wenyon in comment.

Lion (p. 367) found no reciprocal effect of simultaneous infection of fowls with *P. gallinaceum* and *Spirochaeta gallinarum*.

Rodhain (p. 367) quotes experiments which indicate that P. *schwetzi* (which resembles *P. vivax*) is a true parasite of the chimpanzee and is not inoculable to man, whereas *P. vivax* gives rise only to an unapparent infection in the chimpanzee.

Eaton and Coggeshall (p. 368) show that complement-fixing antibodies, but not protective antibodies, are produced in monkeys by the injection of killed *P. knowlesi*, though the latter are provoked by living *P. knowlesi*. The parasiticidal property of serum after infection appears to be due to an anti-erythrocyte substance.

C. W.

Accinelli Fernandez (Nemesio). El paludismo como enfermedad profesional. [**Malaria as an Occupational Disease.**]—*Crónica Méd.* Lima. 1939. Mar. Vol. 56. No. 909. pp. 77–82.

——. Le paludisme comme maladie professionnelle.—*Rev. du Paludisme et de Méd. Trop.* Paris. 1939. Dec. 15. Vol. 1. No. 6. pp. 184–188.

A large number of work-people of both sexes contract malaria in Peru in plantations and in other agricultural pursuits, especially in the coastal valleys in which malaria is endemic. Malaria in such circumstances is an occupational hazard, and the author urges the importance of including it in the list of professional diseases in the Workmen's Compensation Acts. *Norman White.*

Marneffe (H.), Gaschen (H.) & Nguyen-Ba-Tung. Contribution à l'étude du paludisme du delta Tonkinois. [**Malaria in the Tonking Delta.**]—*Arch. Insts. Pasteur d'Indochine.* 1938. Apr. Vol. 7. No. 27. pp. 263–296. With 2 graphs & 1 folding plan.

The middle reaches of the Red River delta in Tonking have a reputation for relative salubrity, but here and there there are places in which malaria has recently been prevalent. Unlike the malaria of the mountainous regions the disease is relatively mild, diffuse and characterized by seasonal epidemic outbursts. Such places are Haiduong, a town of 7,000 inhabitants, and Binh-ha a rural agglomeration of 6,000 in the midst of rice fields in the near vicinity. This report details the results of prolonged investigations that have been carried out into the epidemiology of malaria in these two places.

In Haiduong malaria outbreaks occur at the beginning of summer and in the winter, the former being more severe ; in Binh-ha at the end of autumn. Sometimes outbreaks are severe, pernicious cases

occurring. *P. vivax* is responsible for the majority of infections, but in times of epidemic *P. falciparum* is equally prevalent. *P. malariae* is rare. Anophelines are very abundant but they comprise none of the more important vectors. *A. hyrcanus* var. *sinensis*, of little importance in other parts of Indo-China, is the chief vector; in Haiduong it is anthropophilic. Its excessive prevalence explains its rôle. *A. h.* var. *nigerrimus*, *A. tesselatus* and *A. vagus* exceptionally transmit the disease. The constant coming-and-going of coolies and others between these two places and hyperendemic areas is an important factor in the importation and perpetuation of infection.

In both places control of the disease presents problems of extreme difficulty. In both it is recommended that a beginning be made with the establishment of an anti-malaria dispensary. *N. W.*

FAUST (Ernest Carroll). **Malaria Mortality in the Southern United States for the Year 1937 prepared for the National Malaria Committee.**—*Amer. Jl. Trop. Med.* 1939. Sept. Vol. 19. No. 5. pp. 447–455. With 1 fig.

This is a study of all the statistical material available concerning the incidence of malaria in the Southern States during 1937. The figures compare favourably with those of 1936 and with the 1933–1937 averages. When the figures are compared, however, with those of 1929–1933 no significant change for the better is apparent. There are now more counties in the danger zone than there were during the earlier period and there is concrete evidence that heavily infected territory is extending laterally. A new important zone has developed to the west of the two well defined zones previously existing. This has happened in spite of unusual efforts of all authorities responsible for the public health. *N. W.*

GIGLIOLI (G.). **Malaria in British Guiana. Part I. The Anopheline Mosquitoes of the Colony.**—Reprinted from *Agric. Jl. British Guiana.* 1938. Vol. 9. No. 2. pp. 75–81. With 6 figs. on 3 plates.

——. **Part II. Which of the Local Anopheline Species are Responsible for the Transmission of Malaria ?**—*Ibid.* No. 3. pp. 135–146. With 5 figs.

——. **Part III. Breeding Habits of *A. darlingi*. Natural Factors which limit the Distribution of this Species and of Malaria.**—*Ibid.* pp. 197–206. With 10 figs. on 6 plates.

——. **Part IV. The Distribution of Malaria on the Coastlands. Genesis of Malarial Epidemics.**—*Ibid.* 1939. Vol. 10. No. 1. pp. 1–12. With 7 plates.

These papers are an extension and amplification of a previous publication by the author [see this *Bulletin*, 1939, Vol. 36, p. 809]. Written in a form which is readily comprehensible to a reader having no specialized knowledge of malaria it gives a complete and very readable account of the malaria problems of British Guiana. Still more detailed information is produced to justify the conclusion that *A. darlingi* is the only important malaria vector in the Colony, and that *A. tarsimaculatus* and *A. albitarsis*, which are widely prevalent,

and which in other countries have been incriminated as potent vectors play no rôle of importance in the transmission of the disease. The evidence produced is convincing.

At the end of Part IV the author describes what malaria means to the rural population of the Colony. The vital statistics of three groups of estates in which the spleen rates are under 5, from 5 to 30, and above 30, respectively, are compared. In the first group there have been 244 births for each 100 deaths, and an infant mortality rate of 113 per 1,000 live births (average of 18 years). In the second group there were 152 births per 100 deaths, and the infant mortality rate was 155·9. In the third group there were only 119 births per 100 deaths and the infant mortality rate was 170·9. The stillbirth rates in the three groups were 47, 78, and 92, respectively.

The malaria problem is intimately connected with the two basic agricultural interests of the Colony, sugar and rice cultivation. It is a problem of great magnitude and importance, but the author is confident that if certain limitations in the biology of *A. darlingi* be exploited malaria can be controlled, if not eradicated, in a considerable portion of the inhabited coastland. *N. W.*

Kumm (Henry W.) & Ruiz (Horacio). **A Malaria Survey of the Republic of Costa Rica, Central America.**—*Amer. Jl. Trop. Med.* 1939. Sept. Vol. 19. No. 5. pp. 425–445. With 11 maps.

A remarkably complete description in small space of the physiography of Costa Rica, its climate, its anopheline fauna and of the distribution of its population and of malaria, well illustrated by maps.

Severe endemic malaria is almost confined to low-lying tracts along the Atlantic and Pacific sea-boards: it is rare at elevations above 1,000 feet. The high upland plateau, the *Meseta Central*, the most densely populated part of the country, suffers little and rarely from malaria. The low-lying coastlands are of great importance; here banana cultivation flourishes abundantly. The highest splenic indices were found in villages near the Pacific sea-board: in a dozen villages here situate spleen indices over 40 per cent. were obtained. In all, 9,126 school-children were examined, of whom 12·4 per cent. had enlarged spleens. The spleen rates for the seven provinces varied between zero and 17·2 per cent. Of 3,981 blood films examined 202 revealed *P. vivax*, 217 *P. falciparum*, 235 *P. malariae*, 59 mixed infections, and 172 species undetermined. Quartan fevers were associated slightly more frequently with enlarged spleens than the other two forms of malaria.

Fifteen species of *Anopheles* were identified: *albimanus, anomalophyllus, apicimacula, argyritarsis, bachmanni, chiriquiensis, eiseni, neivai, neomaculipalpis, pseudopunctipennis, punctimacula, strodei, tarsimaculatus, vestitipennis* and *Chagasia bathanus*. *A. albimanus* and *A. argyritarsis* are the commonest: the former is most prevalent in the lowlands; the latter flourishes everywhere, but is most prevalent where malaria does not occur. The number of anophelines identified was 13,393, of which 6,303 were captured as adults. Of these adult captures 87·2 per cent. were *A. albimanus*. The only anopheline found infected was *A. albimanus*. There is no evidence that any anopheline other than *A. albimanus* acts as a natural vector of malaria in Costa Rica. *N. W.*

PICCALUGA (Lorenzo). Influsso dell'età e delle stagioni sulla presenza dei gametociti nei malarici. [**Influence of Age and Season on the Presence of Gametocytes in Blood of Persons Infected with Malaria.**] —*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 3. pp. 166–176. With 6 graphs. English summary.

In San Vito, Sardinia, population 5,000, the author has investigated during a period of five years, the influence of age and season on the appearance of gametocytes in the peripheral blood. Of 1,168 positive blood films gametocytes were found in 172, 14·7 per cent. Of these gametocyte carriers 83 per cent. were under 12 years of age, 11 per cent. from 13 to 19 years, and 6 per cent. 20 years of age or over. Gametocytes can be found in all months of the year. Those of *P. vivax* are numerous in spring, most numerous in midsummer and decline in number in the autumn. *P. falciparum* and *P. malariae* gametocytes are almost completely absent in the spring, appear in summer and are most prevalent in the autumn. *N. W.*

CORRADETTI (Augusto). Sui fattori determinanti i tipi epidemici della terzana benigna e della estivo autunnale. [**Factors determining Epidemic Types of Benign Tertian and Subtertian Malaria.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 3. pp. 177–184. With 1 chart. English summary.

A curve is reproduced showing the monthly incidence of cases of malaria, caused by *P. vivax* and *P. falciparum* respectively, among an Italian population uninfected with malaria at the time of arrival in the hyperendemic area in which the observations were made. Malaria in the Uollo Jeggiu District, the area in question, prevails in epidemic form from July to October, which includes the rainy season : in most of the district November to July is the inter-epidemic period. Subtertian malaria was most in evidence but benign tertian infections were much more in evidence among the non-immune population under observation than among the immunized indigenous population. The author believes that most people in such endemic and hyperendemic areas acquire mixed infections : *P. falciparum* predominates at first ; *P. vivax,* remaining latent, only subsequently reveals its presence. The rise of the subtertian curve depends partly on the latency of benign tertian infections. Of 75 infected persons *P. falciparum* was found in 62·7 per cent. at the first examination, *P. vivax* in 37·2 per cent. ; after these persons had been under observation from 5 to 10 weeks the proportion of *P. falciparum* to *P. vivax* infections was 55·6 to 44·3. *N. W.*

CORRADETTI (Augusto). L'anofelismo nella regione Uollo Jeggiu. [**Anophelism in the Region of Uollo Jeggiu.**]—*Riv. di Parassit.* Rome. 1939. Sept. Vol. 3. No. 3. pp. 207–219. With 1 map & 3 graphs. English summary (6 lines).

The author details the results of a two-year study of anopheline prevalence in the Uollo Jeggiu region of Italian East Africa. Twelve species of Anopheles are found. In the dry season, February to June, at altitudes below 1,000 metres, *A. gambiae* predominates, breeding almost exclusively in perennial streams. From 1,000 to 1,800 metres the most prevalent species are *A. cinereus, A. coustani, A. demeilloni,*

and *A. pretoriensis*; less prevalent were *A. christyi*, *A. gambiae*, *A. pharoensis*, *A. rhodesiensis* var. *dthalisimilis*, *A. squamosus*, and *A. macmahoni*: *A. dthali* was found breeding once; it is extremely rare. Above 1,800 metres the great majority of breeding places contained only *A. cinereus* larvae. In some places numerous larvae of *A. garnhami* were found.

With the advent of the heavy rains dry weather breeding places are scoured out and pools of rain water afford new breeding facilities.

During the rainy season *A. gambiae* is much more prevalent than any other species at altitudes up to 1,800 metres. The prevalence of *A. christyi* also increases during the rains especially between 1,800 and 2,000 metres: like *A. gambiae* it can breed in pools of rainwater apparently deprived of vegetation.

Tables give the prevalence of each species in the different localities in each month of the year. *N. W.*

Russell (Paul F.) & Mohan (B. N.). **Experimental Infections in *Anopheles stephensi* (Type) from Contrasting Larva Environments.** —*Amer. Jl. Hyg.* 1939. Sept. Vol. 30. No. 2. Sect. C. pp. 73–79. [13 refs.]

This paper records an attempt to answer the question "Can the power of an anopheline to transmit malaria be reduced or inhibited by modifying the character of its larval breeding place, as for instance by increasing the ammoniacal or albuminoid nitrogen to a degree less than that required to prevent breeding?"

A strain of *A. stephensi* which came from drinking-water wells in Madras was used. Two colonies were kept going in the laboratory in identical conditions except for differing larval environments. Larvae were reared in tap-water in one case, cow-dung water in the other—120 cc. of fresh cow-dung to 6 litres of tap water. Adults from the cow-dung environment tended to be smaller; the average weight of a fully fed female was 0·00165 gm. as compared with 0·00197 gm. from tap-water.

Mosquitoes from both colonies were given similar opportunities of becoming infected with *P. falciparum*. Females emerging from tap water were infected with sporozoites up to as high a rate as 73·5 per cent., with an average sporozoite index of 37·1 in 634 dissections. Females emerging from cow-dung water were infected with sporozoites up to as high a rate as 70·8 per cent., with an average sporozoite rate of 29·0 in 718 dissections. The chemical character of the water in which *A. stephensi* breeds has little or no influence on the susceptibility of adults to infection with *P. falciparum*. *N. W.*

Russell (Paul F.) & Mohan (B. N.). **Experimental Malaria Infections in Two Races of *A. stephensi*.**—*Indian Med. Gaz.* 1939. Aug. Vol. 74. No. 8. pp. 469–470.

This note concerns the susceptibility to infection with P. *falciparum* of two races of *A. stephensi*, the type form as found in Madras, and *A. stephensi* var. *mysorensis* [Sweet & Rao, see this *Bulletin*, 1938, Vol. 35, pp. 426–427]. Both races were easily infected experimentally and they were about equally susceptible. The percentage of sporozoite

infections in 61 of the type form was 41·0 and in 89 *mysorensis* 36·0, mosquitoes of the two forms having been fed simultaneously on crescent carriers. *N. W.*

STONE (Wm. S.) & REYNOLDS (François H. K.). **Hibernation of Anopheline Eggs in the Tropics.**—*Science.* 1939. Oct. 20. N.S. Vol. 90. No. 2338. pp. 371–372.

Although there is a small amount of anopheline breeding throughout the dry season in Panama the authors consider it to be too slight to account for the sudden increase of larvae found 7 to 10 days after the onset of the rains. Eggs of *A. albimanus* found in December 1938 appeared to be larger than those secured during the summer and required 7 to 14 days, instead of the usual 24 to 48 hours, to hatch.

There are many seepage areas in the Canal Zone which persist for a month after the beginning of the dry season, but thereafter they receive no water. Where the earth is covered by leaves and grass it contains some moisture, but is still crumbly and will not pack in the hand. Superficial earth taken from these areas at the end of the dry season was covered with water and hay infusion and carefully protected. Within a few days larvae of *A. albimanus*, *A. tarsimaculatus* and *A. punctimacula* were recovered. The authors consider that the eggs were present in the earth collected and that, therefore, hibernating eggs are a possible explanation of survival. *C. W.*

VARGAS (Luis). Anofelismo sin malaria en México. [**Anophelism without Malaria in Mexico.**]—*Medicina.* Mexico. 1939. Aug. 25. Vol. 19. No. 346. pp. 334–339. [21 refs.] English summary (7 lines).

In the county of Ocoyoacac, District of Lerma, Mexico, there is a locality in which anopheline prevalence is high but there is no endemic malaria. The only anopheline found belongs to the *A. maculipennis* group and has been called *A. maculipennis* var. *aztecus.* The author describes its morphology, reviews the literature, and concludes that it should be called *A. aztecus* (Hoff 1935) Vargas 1939.

N. W.

VRYONIS (George). **Observations on the Parasitization of Erythrocytes by *Plasmodium vivax*, with Special Reference to Reticulocytes.**—*Amer. Jl. Hyg.* 1939. Sept. Vol. 30. No. 2. Sect. C. pp. 41–48. [13 refs.]

The author has made counts of erythrocytes, reticulocytes and ring forms of parasite in a case of *Plasmodium vivax* infection. The counts were made after the ninth, eleventh and seventeenth rigors. Rings were found in both reticulocytes and mature erythrocytes, but the former were infected over a hundred times as frequently as the latter. The earlier the count was made after the rigor the greater was the percentage of reticulocytes infected. This was the case all through the observation period, though the malarial parasites decreased in number while the reticulocytes increased. During the early stages of the malarial infection, when the number of reticulocytes was small, there was a transient increase in their number with each attack of fever. Later, when the number was large, this transient increase was not

apparent. It is concluded that it is the stickiness of the reticulocytes which accounts for the frequency of their infection with the rings of *P. vivax*. *C. M. Wenyon.*

GREIG (E. D. W.) & NEIL (Alexander). **Observations on Haemoglobin, Reticulocytes, and Blood Sedimentation Rate in Cases of Therapeutic Malaria and the Effects of Treatment of them.**—*Jl. Trop. Med. & Hyg.* 1939. Sept. 15. Vol. 42. No. 18. pp. 277–281. With 8 graphs.

A summary is given of previous observations on reticulocytes in malaria and blackwater fever. FAIRLEY and BROMFIELD [this *Bulletin*, 1934, Vol. 31, p. 176] observed that reticulocytes in cases of malaria varied from 0·6 to 10·9 per cent. of the red cells; they found that blood destruction in malaria was followed by a compensatory hypertrophy of red bone marrow, normoblastic not megaloblastic as in pernicious anaemia. MENON, KRISHNASWAMY and ANNAMALAI [this *Bulletin*, 1935, Vol. 32, p. 789] found that in ten cases of acute malaria the average percentage of reticulocytes was 1·06, and in chronic cases 3·55; when quinine was given the counts began to rise after two or three days and continued to rise for another two or three days. BLACKIE [this *Bulletin*, 1935, Vol. 32, p. 832] found that in blackwater fever erythropoiesis is inhibited, as manifested by a low reticulocyte count, but with the cessation of haemolysis the reticulocyte count rises rapidly. Other observations along the same lines are recorded.

In the present note, the authors place on record observations made by them in the course of investigations on a large number of cases of general paralysis treated by *Plasmodium vivax*. On a number of these cases a continuous series of observations was carried out on the haemoglobin, reticulocytes and blood sedimentation rate.

The authors give the following summary of their work and the conclusions drawn :—

" (1) *Reticulocytes*.—The reticulocytes were enumerated in a series of cases of malarial infection and the results recorded. In all cases an increase in number of reticulocytes followed, at varying intervals, the administration of specific drugs, quinine and plasmoquine co. In a non-malarial case in which full doses of quinine had been given for fourteen days no increase of the number of reticulocytes was observed. It would appear that administration of quinine in malarial infections brings about a haemolysis followed by an erythropoiesis, and this observation tends to support the well-known view that under certain conditions quinine may be a factor in precipitating an attack of blackwater fever. Also it supports the observation of Machwiladze and Kurpanova (1933), and their suggestion that an enumeration of reticulocytes before and after administration of quinine might be of help in the diagnosis of cases of latent malaria.

" (2) *Haemoglobin*.—Associated with the rise in the number of reticulocytes in the cases of malaria there was a marked fall in the haemoglobin curve, the extent of which varied in different cases. Estimation of haemoglobin can be easily carried out and should be undertaken along with other measures in the management of cases undergoing malaria therapy, as it will give useful information in respect of the progress of the case.

" (3) *Sedimentation Rate*.—There was a definite increase in the rate during the malarial infection. Following administration of specific drugs it did not increase as the reticulocyte count did, but tended to return gradually to normal. This test can be easily carried out also, and would give useful information in cases treated by malaria." *W. Yorke.*

LESNÉ, CAYLA & LICHTENBERGER. Paludisme d'inoculation chez un nourrisson de 7 mois après injection de sang paternal. [**Infant of Seven Months Infected with Malaria by Injection of Father's Blood.**]—*Rev. du Paludisme et de Méd. Trop.* Paris. 1939. July 15. Vol. 1. No. 3. pp. 92–94. [18 refs.]

An infant very ill with broncho-pneumonia received intramuscular injections of his father's blood. Two months later the infant developed a fever of quartan type. At that time no parasites were found in the blood but the fever responded to quinine. During a subsequent relapse *P. malariae* was found in the blood. The infant had never been outside Paris. The father had left the Cameroons 13 years previously ; there he had suffered from fever. He had had no fever since his return to France. Examinations of his blood revealed no parasites. *N. W.*

NABARRO (David) & EDWARD (Derrick G.). **Accidental Transmission of Malaria to a Child by the Injection of Blood.**—*Lancet.* 1939. Sept. 2. pp. 556–558.

An infant suffering from melaena neonatorum was treated by an intramuscular injection into the buttock of 7 cc. of her father's blood. When ten weeks old she was readmitted to the same hospital in London suffering from quartan malaria. Numerous *P. malariae* were found in the blood. She died. There was no probability that the infant could have acquired the infection naturally in England. Her father had lived in Ceylon for many years where he took prophylactic quinine ; he was unaware that he had ever been infected with malaria. He left Ceylon 12 years ago and has enjoyed perfect health since. Ten cc. of his blood was injected into a patient requiring malaria therapy ; no evidence of malaria infection being forthcoming the patient was inoculated with *P. ovale.* Soon after he had developed this form of malaria parasites of *P. malariae* appeared in the blood and subsequently predominated.

It is concluded that all who have had malaria or who have lived in malarious countries are not suitable as blood donors. Infants and children are particularly liable thus to acquire malaria accidentally. In latent malaria the parasites are probably of low virulence and may be unable to infect adults. *N. W.*

GONZÁLEZ BARRERAS (Pedro). Colorantes azoicos y paludismo.—[**Azo Dyes and Malaria.**]—*Bol. Oficina Sanitaria Panamericana.* 1939. Aug. Vol. 18. No. 8. pp. 753–757.

The author has treated eight cases of malaria in Havana with rubiazol (prontosil) with favourable results : fever fell to normal rapidly and schizonts of *P. vivax* and *P. falciparum* disappeared from the peripheral blood within 60 hours. It has, however, no effect on the gametocytes of *P. falciparum.* *N. W.*

YOUNG (Martin D.) & MCLENDON (Sol B.). **Treatment of Induced Malaria in Negro Paretics with Mapharsen and Tryparsamide.**—*Public Health Rep.* 1939. Aug. 18. Vol. 54. No. 33. pp. 1509–1511.

Ten negro patients who had been infected for therapeutic purposes with *P. malariae* were given mapharsen, 0·04 gm. intravenously once a

week for 10 weeks. Eleven other similar patients received tryparsamide treatment. Mapharsen relieved the symptoms of malaria but in no single case did it eradicate the parasites. The blood of all ten patients treated with it still contained parasites 22 weeks after the completion of the treatment. Subinoculations with the blood of two of these patients showed that the parasites remained viable. Tryparsamide was equally impotent against the parasites. As these drugs relieved symptoms of malaria without eradicating infection reliance on their use might result in quartan malaria carriers being released from hospital with the danger that foci of infection of a type of malaria rare in the U.S.A. might be established. *P. malariae* is favoured in malaria therapy, there being but little immunity against it. It is, moreover, reliable and the rest periods between paroxysms are in its favour.

N. W.

Casini (Guido). Trattamento della malaria in campagna con adrenalina per via endovenosa. [**Treatment of Malaria in Rural Area by Intravenous Adrenalin.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 3. pp. 189–198. English summary.

In two small rural communities in Sardinia selection was made of persons between 6 and 50 years of age suffering from malarial splenomegaly who were exempt from concomitant pathological conditions that would contraindicate intravenous adrenalin therapy. These were divided into two strictly comparable groups, the one group receiving treatment according to Ascoli's method, the other being untreated controls. In one community there were 24 cases treated and 24 controls ; in the other 24 treated and 12 controls. The treatment was carried out in the spring and summer of 1938, and the members of both groups were kept under observation till the close of the year. It was found that doses of 1/10 and 1/20 mgm. of adrenalin were generally productive of extreme pallor, cyanosis, tachycardia, arrhythmia, and severe headache. In one case such disturbances lasted three weeks. Adrenalin did not activate latent malaria infections. There was no significant difference between the number of malaria attacks in the two groups. There was no greater diminution in the size of the spleens in the treated groups than was observed in the untreated controls. No improvement of the blood or of the general condition of the patients could be ascribed to the adrenalin therapy.

N. W.

Marotta (Gaetano). Osservazioni sul trattamento con adrenalina di malarici ospedalizzati. [**Adrenalin Treatment of Malaria in Hospital.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 3. pp. 199–210. English summary.

This is a detailed record of 24 patients suffering from malaria treated in hospital by Ascoli's method and two treated with adrenalin by mouth. Febrile manifestations before and during treatment were treated with quinine. The recorded observations justify the author's conclusions that adrenalin is without action on the manifestations of malaria, does not shorten the disease and does not reinforce the action of quinine. It does not prevent relapses. Intravenous injections produce a contraction of the spleen which lasts from 3 to 4 minutes.

The size of the spleen immediately after treatment and later is determined by the number of attacks of fever suffered and the adequacy of their quinine treatment. No evidence was forthcoming that adrenalin improved the blood or the patient's general condition. The temporary circulatory and other disturbances that follow the intravenous injections may cause disquiet to the physician who is unfamiliar with them. *N. W.*

Pizzillo (Giuseppe). Sindromi nervose da malaria e loro terapia splenocontrattile venosa. [**Nervous Syndromes of Malaria and their Treatment with Intravenous Adrenalin.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 3. pp. 211–221. [10 refs.]

The author passes in review the various forms of implication of the nervous system met with in malarial infections and describes in detail three illustrative cases. One exhibited a cerebellar syndrome as a complication of a primary attack of subtertian malaria that failed to respond to intensive quinine therapy. The other two were more chronic forms of malaria complicated with sciatica. The recovery of all three was brought about by treatment with intravenous injections of adrenalin according to Ascoli's method. *N. W.*

Ahmed (N.). **Five Years of Anti-Malaria Work at Barwadih Railway Settlement.**—*Indian Med. Gaz.* 1939. Aug. Vol. 74. No. 8. pp. 472–476. With 1 chart.

Barwadih is a railway settlement, 348 miles west of Calcutta in the hilly tracts of the Ranchi plateau, Bihar. It was highly malarious. *A. culicifacies* has been found infected; other potentially dangerous species that occur locally are *funestus, stephensi, maculatus* and *listoni*. The topography is described as are the persistent efforts that have been made through five years to control anopheline breeding. The results have been good. The spleen index which was 47 in 1932 was only 6 in 1936: in the same period the parasite index was reduced from 48 to 0·7, and the loss of days of work occasioned by malaria from 3,059 to 1,179. *N. W.*

O'Neill (John H.). **Concrete-lined Ditches for Mosquito Control.**—*American City.* 1938. Aug. Vol. 53. No. 8. p. 38. [Summary taken from *Public Health Engineering Abstr.* Washington. 1939. Sept. 30. Vol. 19. Signed Howard M. Hurst.]

"Proper maintenance of road-side ditches presents quite a problem where grades are necessarily flat and where soil erodes easily and vegetation grows rapidly. Under such conditions pools of shallow water readily accumulate which are favourable to mosquito breeding. Cleaning of these unlined ditches often results in cutting the bottom below grade thus increasing the number of pools.

"Such conditions were overcome at Norco, La., through cooperation of the Louisiana State Department of Health, a large oil refinery, and W.P.A. officials. Through these agencies a reinforced concrete-lined ditch was constructed on a sand fill to the exact grade. Templates were used on 1 in.×4 in. guide rails to insure proper cross section. Cement was of 1 : 2 : 4 mix and mixed entirely by hand. Top forms

were left in place for two hours, the top layer of concrete having been rodded in place by leaves from automobile springs. After initial set a sand cement finish was applied by hand and the ditch flooded to insure good cure. Bottom of the ditch was sloped to one side to accumulate small flows. The article shows several photographs during successive stages of construction."

Kubo (Michio) & Ohito (Eijiro). **About a New Mosquito-Larvicide Oil.**—*Jl. Oriental Med.* 1939. Sept. Vol. 31. No. 3. [In Japanese pp. 407–409. English summary p. 36.]

" Though many kinds of mosquito control methods have been reported in various parts of the world, they are not so suitable for practical use in Manchoukuo.

" So we have studied a new larvicide oil and obtained the following very satisfactory result.

" Material : a. ' Dapus ' oil, b. Leave [? residual] oil, both produced abundantly in the process of oil manufacture in Fushun oil Factory.

" Doses : mix equal parts of the two kinds of oil and use 1 L[itre] per 1·5–2 acres for rice fields. Higher doses are preferable for ponds or marshes.

" Oiling : Drip cans may be used for automatic oiling of irrigating streams of rice fields. They may be used as follows : A nail is driven through the bottom of the receptacle, and a piece of wool wrapped round the head of the nail. By pulling on the latter the flow may be regulated. For ponds or marshes, use of spray-pump is advisable.

" Result : Not only mosquito larvae die in one day, but also other insects harmful to rice plants are injured. And of course the oil is harmless to the rice plant."

Syddiq (M. M.). **Some Observations of Practical Importance and Interest for the Malariologist.**—*Indian Med. Gaz.* 1938. Nov. Vol. 73. No. 11. pp. 676–678. [Summary taken from *Public Health Engineering Abstr.* Washington. 1939. Sept. 30. Vol. 19. Signed H. A. Johnson.]

" The author describes a method for mixing up mud balls weighing about two ounces, which contain 2 per cent. Paris green. These balls when added to water liberate Paris green which is fatal to culex as well as anopheles larvae, provided the water depth is not over five feet. Two balls are sufficient for about 8 cu. feet of water. One per cent. Paris green applied once a week to rice crops did not damage the plants, whereas two per cent. was destructive to the crop. Dewatering and drying up of the mud in paddy fields has a decidedly detrimental effect on the water forms of mosquitoes, although the pupae seem to be less affected. The program of alternately flooding and drying rice fields in 6-day cycles is said to be very effective in controlling mosquitoes. A formula for a repellent cream is given, consisting of oil of citronella, coconut oil, and other substances. The cream is said to be clean, simple to apply, and the effects are more lasting than the preparation usually employed."

Sen (Purnendu). **Can Paris Green kill Fish ?**—*Bengal Public Health Jl.* 1939. June. Vol. 1. No. 1. pp. 9–12.

The author's experience leads him to believe that Paris green, in the amounts generally used as a larvicide, cannot cause the death of fish.

N. W.

LARTIGUE (Jean), GRENOILLEAU (Jean), MEGNIN (Julien) & LAURENS (Louis). Prophylaxie et traitement du paludisme dans le département d'Alger. [**Prevention and Treatment of Malaria in the Department of Algiers.**]—*Rev. du Paludisme et de Méd. Trop.* Paris. 1939. July 15. Vol. 1. No. 3. pp. 86–91.

i. SCHILLING (Claus). Immunizzazione contro la malaria. [**Immunization against Malaria.**]—*Rendiconti Istituto di Sanità Pubblica.* Rome. 1939. Vol. 2. Pt. 2. pp. 365–374.

ii. ——. Schutzimpfung gegen Malaria.—*Deut. Med. Woch.* 1939. Aug. 11. Vol. 65. No. 32. pp. 1264–1267.

i. This lecture deals with problems of immunity against malaria infection, apart from premunition, and summarizes some of the results of experiments carried out by the author during recent years. It is possible to inject about 100 schizonts or sporozoites into a healthy human being without giving rise to fever or the appearance of parasites in the peripheral blood. The human body thus has a minimal, but fundamental, resistance to malaria. Is it possible by repeated inoculation of malaria parasites to increase this minimal natural resistance to the point of obtaining real immunity without producing the disease with fever and parasites in the blood? Such an increased resistance against schizonts can be conferred. Three patients received first injections of 750, 1,000 and 1,250 schizonts respectively; in three subsequent injections the dose was increased to 50,000, 60,000 and 80,000 schizonts without giving rise to any febrile manifestations. Another person receiving an injection of 1,000 schizonts developed a mild attack of malaria after a prolonged incubation. The author raises the question of the applicability to malaria therapy of this method of inoculation by increasing doses. This immunity against schizonts does not postulate immunity against sporozoites: the application of infected mosquitoes to the patients immunized against schizonts was invariably followed by infection. If sporozoites be injected subcutaneously in small non-infecting doses the immunizing results are very small. Twelve volunteers received doses of from 200 to 1,600 sporozoites; in seven neither fever nor parasitaemia followed, but increased doses produced infection in all. In these attempts at immunization other factors than the nature of the antigen are important, the chief being the receptivity of the individual treated; this varies greatly. Experiments are now in progress in which sporozoites are being injected intravenously. One patient has received in the space of two months four intravenous injections of 100, 500, 2,500 and 8,000 sporozoites, respectively, without any febrile reaction.

An attempt has been made to try to use anti-schizont immunity, which is readily conferred, as a basal immunity and to reinforce it by the subsequent injection of sporozoites. Three men were vaccinated till they were able to withstand doses of 27,600, 27,600 and 32,000 schizonts; then the injection of sporozoites was begun. One was infected after the 5th injection of 1,200 sporozoites. The other two who received 4 and 2 injections were not infected. These two were then bitten by infected mosquitoes. One was infected; the other has remained without fever and without parasites in the blood for three months.

The ultimate objective of this work is the discovery of a method of vaccination against malaria. The author discusses the benefits that

such a procedure might confer and refers to the many problems that will have to be solved.

The experiments were confined to *P. vivax.*

ii. This is an account of the same work.

[Reference may be made to the work of SERGENT, SERGENT and CATANEI, this *Bulletin*, 1924, Vol. 21, pp. 139, 289, 290. See also SCHILLING, this *Bulletin*, 1938, Vol. 35, p. 429.] *N. W.*

SCHILLING (C.). Immunisation contre le paludisme. [**Immunization against Malaria.**]—*Rev. du Paludisme et de Méd. Trop.* Paris. 1940. Jan. 15. Vol. 2. No. 7. pp. 8–11.

This is a précis of the work of SCHILLING abstracted above.

GIOVANNOLA (Arnaldo). I plasmodi aviari. [**Bird Malarial Parasites.**]—*Riv. di Parassit.* Rome. 1939. Sept. Vol. 3. No. 3. pp. 221–266. With 4 figs. & 3 coloured plates. [193 refs.]

In this article the author discusses in a comprehensive manner the malarial parasites of birds. He considers the various species which have been described and comes to the conclusion that 15 of these are valid. In three excellent coloured plates with five figures for each the characters of these 15 species are depicted. A list of birds from which malarial parasites have been recovered is given, as also a list of mosquitoes which have been infected with bird malarial parasites. In a final section the occurrence of exoerythrocytic schizogony is discussed. It is concluded that on account of the existence of these forms the two families Plasmodiidae and Haemoproteidae should be fused as one. To the reviewer it seems that two arguments may be raised against this procedure. The one is that exoerythrocytic schizogony has been demonstrated in only certain forms of bird malarial parasites and the other is that erythrocytic schizogony is a feature of all the Plasmodiidae and of none of the Haemoproteidae. There is thus a definite point of distinction between the two families. The paper is a very valuable one which will be of the greatest assistance to those who have to work with bird malarial parasites. *C. M. Wenyon.*

LION (M.). Infection combinée par *Spirocheta gallinarum* et *Plasmodium gallinaceum.* [**Combined Infection with** *S. gallinarum* **and** *P. gallinaceum.*]—*Bull. Soc. Path. Exot.* 1939. July 12. Vol. 32. No. 7. pp. 713–716.

The author has infected fowls with *Plasmodium gallinaceum* and *Spirochaeta gallinarum* with the object of finding out if the one infection influences the other, as in the malaria therapy of general paralysis in man. There does not appear to be any influence ; the spirochaetal infection terminates in five or six days, leaving an immunity to reinfection, while the malarial infection persists and continues its usual course. *C. M. W.*

RODHAIN (J.). La réceptivité du chimpanzé *Pan satyrus* au *Plasmodium vivax* humain. [**Susceptibility of the Chimpanzee to** *P. vivax* **of Man.**]—*C. R. Soc. Biol.* 1939. Vol. 132. No. 23. pp. 69–70.

In this paper the author returns to the subject of the susceptibility of the chimpanzee to *Plasmodium vivax.* One of these apes was found

to be suffering from a *P. reichenowi* infection when it arrived in Antwerp from the Belgian Congo. Its blood, inoculated to two patients, failed to produce any infection, another indication that this parasite differs from *P. falciparum*. The chimpanzee was then inoculated with the blood of another chimpanzee harbouring the *P. vivax*-like parasite *P. schwetzi*. An infection developed after 48 days. Blood which now contained both parasites was inoculated to a patient, who acquired no infection. The chimpanzee was then inoculated with blood from a patient showing *Plasmodium vivax*. Nineteen days after the inoculation, no parasites having been detected, blood was inoculated to a patient, who acquired a mild *P. vivax* infection after an incubation period of 22 days. Blood from this patient inoculated to another chimpanzee produced no infection. It thus appears that *P. schwetzi* behaves as a true parasite of the chimpanzee and is not inoculable to man, whereas *P. vivax* of man, which it resembles morphologically, gives rise only to an inapparent infection in the chimpanzee.

C. M. W.

i. Eaton (Monroe D.) & Coggeshall (L. T.). **Immune Response of Rabbits to Injection of** *Plasmodium knowlesi*.—*Jl. Experim. Med.* 1939. Aug. 1. Vol. 70. No. 2. pp. 131–139.

ii. —— & ——. **Production in Monkeys of Complement-Fixing Antibodies without Active Immunity by Injection of Killed** *Plasmodium knowlesi*.—*Ibid.* pp. 141–146. [13 refs.]

i. In the first of these papers the authors show that complement-fixing antibodies are produced in the serum of rabbits in response to injections of living or dead *Plasmodium knowlesi*, while the serum of rabbits which have been injected with normal or parasitized monkey erythrocytes acquires parasiticidal properties detectable by *in vitro* tests against *P. knowlesi*. This property is absorbed by normal monkey erythrocytes, so that it appears that it is largely due to an anti-erythrocyte substance. Attempts to produce passive immunity by the injection of such parasiticidal rabbit serum failed.

ii. In the second paper it is shown that though the injection of killed parasites into monkeys will stimulate the production of complement-fixing substances no detectable agglutinins or protective antibodies are produced. It thus appears that the injection of killed parasites failed to produce these protective antibodies, which it has been shown result from an actual infection. *C. M. W.*

BLACKWATER FEVER.

Précis of Abstracts in this Section.

Fairley (p. 369) shows that methaemalbumin is formed from haematin derived from the breaking down of extracorpuscular haemoglobin, and serum albumin. Like bilirubin it is disposed of *via* the liver and is present in greater concentration in the circulation when the intravascular haemolysis is associated with liver disease.

Greig and Neil (see *Malaria* above, p. 361) consider that the administration of quinine in malarial infections brings about haemolysis

followed by erythropoiesis. This tends to support the view that quinine may precipitate an attack.

Chiu (p. 369) reports that blackwater fever is rare in many parts of China, including Kowloon, where subtertian malaria is rampant, and records one case in a Chinese from Shanghai.

Lamborn (p. 370) attempted to infect 50 *A. gambiae* and 50 *A. funestus* from a patient at the height of an attack of blackwater fever, but tests of these failed to show infection. *C. W.*

Fairley (N. Hamilton). **Methaemalbumin in Man (Pseudo-Methaemoglobin).**—*Proc. Roy. Soc. Med.* 1939. Aug. Vol. 32. No. 10. pp. 1278–1280 (Sect. Therap. & Pharmacol. pp. 74–76).

The author summarizes in this note his personal investigations on methaemalbumin made in London and Macedonia during the last five years. Most of the information given here has already been recorded elsewhere [this *Bulletin*, 1937, Vol. 34, p. 841; and 1939, Vol. 36, p. 885]. A description is given of the spectrum of methaemalbumin, of its general chemical behaviour, and of its synthesis *in vitro* and *in vivo*. The following are the author's conclusions :—

"The general conclusion reached as a result of these investigations is that in man methaemalbumin is formed from extracorpuscular haemoglobin when blood is destroyed in large quantities and remains in the circulation for a sufficient period of time. During the extracellular katabolism of haemoglobin, the molecule is split into globin and haem. The haem is oxidized to haematin which promptly unites with serum albumin to form methaemalbumin, the latter not passing through the kidney and never appearing in the urine. Recent work by Rimington indicates that haematin injected intravenously produces an increased porphyrin excretion in the faeces. In view of these findings and the observations of Duesberg (1935) it is evident that, like bilirubin, methaemalbumin is disposed of via the liver and would be present in greater concentration in the circulation when intravascular haemolysis was associated with liver disease. This I have recently confirmed clinically in cases of cirrhosis of the liver and splenomegaly associated with haemolytic anaemia and haemoglobinuria."

W. Yorke.

[A reference to blackwater fever is contained in the paper by Greig and Neil see Malaria, p. 361 above.]

Chiu (P. P.). **The Occurrence of Blackwater Fever in the New Territories of the Kowloon Peninsula (Hong Kong). Report of a Case.**—*Chinese Med. Jl.* 1939. Aug. Vol. 56. No. 2. pp. 157–158.

Chiu writes that considering the high incidence of malaria in many parts of China, it is surprising to find that blackwater is a comparatively rare disease. He records that Seaton states that it is only found in Yunnan, Hainan Island, and occasionally in the South China ports.

Chiu gives details of a case of blackwater fever encountered in the New Territories of the Kowloon Peninsula, a district where malignant tertian malaria is rampant and blackwater fever apparently extremely rare.

The patient was a Chinese, aged 26 years, and was admitted to the University Medical Unit with a history of fever for ten days, and passage of "red urine" for six days. He was an emigrant from

Shanghai, and for two years had been employed as a coolie in the Hong Kong Mines in the New Territories.

Details are given of the results of blood and urine examination.

W. Y.

NYASALAND PROTECTORATE. ANNUAL MEDICAL AND SANITARY REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1938.—[**Malaria** pp. 46–47, LAMBORN (W. A. S.).]

Lamborn fed 50 *A. gambiae* and 50 *A. funestus* on a European patient at the height of an attack of blackwater fever, and subsequently the majority of these fed on two native boys of 10 years of age between the 7th and 32nd days. There were no reactions in either of the boys, who have been under observation for 4 months. No parasites were found in a search of 17 of the *A. gambiae* and 14 of the *A. funestus* used in the experiment.

C. W.

BANERJEE (Bibhuti Bhusan). **A Note on the Etiology and Treatment of Black-Water Fever.**—*Calcutta Med. Jl.* 1939. Sept. Vol. 36. No. 3. pp. 187–189.

BACILLARY DYSENTERY, BALANTIDIUM AND GIARDIA INFECTIONS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

Bacillary Dysentery.—STERNBERG (p. 371) reports favourably on ammonium mandelate in the treatment of gastro-intestinal infection.

SAKANAKA (p. 371) describes a series of patients suffering from ekiri, a disease resembling bacillary dysentery. With HUZII (p. 372) he records two cases of mixed infection with enteric and dysentery.

Balantidial Dysentery.—WESTPHAL (p. 372) describes a case of infection with *Balantidium coli* and concludes that man is not a natural host and that the ciliate alone does not cause symptoms in man. YOUNG (p. 373) reports diarrhoea and occasional dysentery in 7 patients infected with *Bal. coli.* In two the ciliates disappeared after carbarsone treatment. ARCHETTI (p. 373) found by careful measurement that the species of Balantidium in one human case was *coli*, not *suis.*

LEVINE (p. 373) shows that for successful subculture of *Bal. coli*, fresh tubes of Ringer-serum-starch medium must be inoculated with at least 10,000 individuals; growth takes place in the presence of *Ps. pyocyanea* and Blastocystis. LEVITANSKAIA (p. 373), however, describes cultures obtained from a single *Bal. coli.*

Giardia Infection.—With regard to the pathogenic power of *G. intestinalis* different opinions are still expressed. MANDOUL (p. 374) states that it has no power of invading the tissues but that it may sometimes give rise to enteritis. BONANNO (p. 374) thinks that in the bile ducts it may irritate the mucosal lining but acts mainly by obstructing the flow of bile. DE MURO (p. 375), however, considers *G. intestinalis* to be highly pathogenic in the colon, biliary passages and liver, a view which is supported by CHODZKO (p. 375). Similarly VÉGHELYI (p. 375)

states that in children, although the infection is symptomless in one-third, it may lead to an acute disease which may become chronic. He (p. 376) attributes a state simulating coeliac disease in one child, and of infective fat absorption in a series of children, to the adhesion by the flagellates to the intestinal mucosa and the consequent impairment of absorptive capacity.

Laborde (p. 376) regards *G. intestinalis* as pathogenic, and Grott (p. 376) conjectures that it might predispose to malignant disease. That it may cause intractable diarrhoea is the view of Cain and Sikorav (p. 377), and Chopra *et al.* (p. 377) think that in some cases in children it may lead to intestinal disturbance. [Reference may be made to the discussion of this subject by Wenyon in his *Protozoology*, 1926, p. 703 *et seq.*]

Treatment by atebrin, in the doses usually employed in malaria, and given by the mouth, was found to be very effective by a number of authors, but de Muro (p. 378) and Grott (p. 379) report even better results with acranil (Bayer), a hydrochlorate of a new acridinic compound. *C. W.*

Sternberg (Gunnar). Behandling av gastro-intestinala infektioner med ammoniumamygdalat. [**Treatment of Gastrointestinal Infections with Ammonium Mandelate.**]—*Nordisk Med.* 1939. Oct. 28. Vol. 4. No. 43. pp. 3210–3214. English summary.

Three cases of colitis and 9 of acute gastritis or gastro-enteritis were treated with ammonium mandelate. Doses of 5 cc. twice daily by mouth until the consistency of the stools became normal were used in acute cases, three times daily for a week at a time in chronic cases. The results in severe acute cases were good and rapid, cure being achieved in one to three days. There are no harmful effects. The author suggests that this treatment be tried in severe diarrhoea of infants, typhoid, dysentery and cholera. *C. W.*

Sakanaka (Tadaiti). Klinische Beobachtungen ueber Dysenterie und Ekiri in der Stadt Okayama. [**Clinical Observations on Dysentery and Ekiri in Okayama State.**]—*Okayama-Igakkai-Zasshi* (*Mitt. d. Med. Gesellsch. z. Okayama*). 1939. June. Vol. 51. No. 6. [In Japanese pp. 1377–1384. [15 refs.] German summary p. 1385.] [Summary appears also in *Bulletin of Hygiene.*]

Ekiri is the name given to a disease resembling bacillary dysentery with severe toxic symptoms [see this *Bulletin*, 1936, Vol. 33, p. 709]. Among the 105 cases with which this article deals, five at least and perhaps more were instances of ekiri. All were seen in the Okayama hospital during 1937. In 77 [the author states " 78 " but his figures total one less] he isolated and typed the organism according to Futaki's classification. In two, the organism being komagome-A, the course was severe and prolonged, but both recovered; in 58 with komagome-B, 18 were mild, 28 moderately severe and 12 very severe, of whom 11 died. The course in these also was long and, in children particularly, closely resembled ekiri; it was among these that the fatalities occurred. Eight were attacked by the kawase organism; the course in these was somewhat shorter than the last-named, but at the onset there were marked toxic symptoms. Six with Nakamura's organism ran a milder, only moderately severe, course and not prolonged; two with Ohara's

organism ran a severe course with symptoms like ekiri and both died. One, due to Schmitz' bacterium, was a mild case, in the 78th the type was not determined, but the disease was mild.

Of the 27 from whom the organism was not isolated, 7 were children, 5 had a severe ekiri-like attack and 3 of them died; of adults and aged there were ten each, for the most part mild, but two of the oldest died. *H. H. S.*

Sakanaka (Tadaiti) & Huzii (Tosio). Ueber 2 Fälle von Mischinfektion von typhöser Erkrankung und Dysenterie. [**Two Cases of Mixed Infection with Enteric and Dysentery.**]—*Okayama-Igakkai-Zasshi* (*Mitt. d. Med. Gesellsch. z. Okayama*). 1939. June. Vol. 51. No. 6. [In Japanese pp. 1386–1396. With 3 charts. [20 refs.] German summary pp. 1396–1397.]

Enteric fever, mainly paratyphoid, and dysentery together are not common; the authors affirm that till the time of their recording these two cases ten only had been recorded in Japan. The two here mentioned they saw in the summer of 1937.

The first was a man of 23 years admitted with suspected dysentery, but his blood showed marked leucopenia and there was cerebral disturbance with fever and troublesome diarrhoea. From his blood *Bact. paratyphosum B* was grown and from the stool Kawase's dysentery bacterium [Futaki's classification]. In spite of all treatment the disease progressed rapidly to a fatal issue.

The second was a boy of 12 years under treatment for typhoid fever. During convalescence he suddenly developed dysenteric symptoms—diarrhoea, tenesmus, tenderness over the sigmoid. Dysentery komagome-B organism was isolated from the stools and his serum agglutinated both this and *Bact. typhosum.* This patient made an uneventful and fairly speedy recovery. *H. H. S.*

de Mello (F.) & Vaga (A.). Premier cas de balantidiose humaine observé à Goa. [**First Human Case of Balantidium Infection observed at Goa.**]—*Bull. Soc. Path. Exot.* 1939. Jan. 11. Vol. 32. No. 1. pp. 38–39.

Westphal (Albert). Experimentelle Untersuchungen ueber einen als chronische Balantidiose erscheinenden Krankheitsfall. [**Experiments in Connexion with a Case of Apparent Chronic Balantidial Infection.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. July. Vol. 43. No. 7. pp. 299–306.

A woman sixty years of age suffering from some form of intestinal derangement was found to have a *Balantidium coli* infection. Treatment with acranil brought about an apparent disappearance of the ciliate infection, while subsequent treatment with yatren and emetine improved the patient's condition. Material was inoculated by a special technique into the caecum of two rabbits, both of which acquired a ciliate infection, thus proving that the disappearance from the patient was more apparent than real. One of the rabbits died of wasting associated with diarrhoea, the ciliate being found in the caecum. The second rabbit lost its ciliate infection but contracted a diarrhoea with cachexia. In rabbits experimental balantidial infection is symptomless, so it is concluded that in the case in question there was in addition to the ciliate infection also one with pathogenic bacteria. The patient

was not seen again for four years, when a re-examination revealed a heavier balantidial infection than had been present four years earlier. Nevertheless the patient was in better health. It is concluded that human beings are not natural hosts of *Balantidium coli* and that when symptoms are present these are due to some bacterial infection which may only be detected by experiments like those carried out in the case described. *C. M. Wenyon.*

Young (Martin D.). **Balantidiasis.**—*Jl. Amer. Med. Assoc.* 1939. Aug. 12. Vol. 113. No. 7. pp. 580–584. With 6 figs. [11 refs.]

The paper reports seven cases of infection with *Balantidium coli* in mentally defective patients of the South Carolina State Hospital and two other cases from Tennessee noted by Meleney. The patients had chronic diarrhoea and occasional dysentery. From two of the cases the ciliates disappeared with carbarsone treatment. It seems from the habits of the patients that infection is probably from man to man, rather than from pig to man as is usually the case. Before the present report there had been recorded in the United States 32 cases from 16 States. The present paper reports a further nine cases together with two more, also from Carolina, mentioned in an addendum. The paper is illustrated with photographs of the ciliate and its cyst.

C. M. W.

Archetti (Italo). Zur Artfrage des Balantidium im Menschen. [**Species of Balantidium in Man.**]—*Ztschr. f. Parasitenk.* 1938. Dec. 14. Vol. 10. No. 5. pp. 545–548.

The author has investigated a case of balantidial dysentery from the point of view of the species of ciliate present. In pigs two species, *Bal. coli* and *Bal. suis*, occur but for some unexplained reason the former alone has been found in man. The differentiation of the two species depends on careful measurements of a large number of individuals, a procedure which is not usually carried out in the case of human infections. In the present instance the measurements have shown, as has been the case with three infections studied by other observers, that the ciliate was *Bal. coli* and not *Bal. suis*. *C. M. W.*

Levine (Norman D.). **Observations on *Balantidium coli* from Swine in Culture.**—*Jl. Parasitology.* 1939. Oct. Vol. 25. No. 5. pp. 401–404.

A culture of *Balantidium coli* having been obtained from the faeces of swine on Ringer's-serum-starch medium, attempts were made to commence subculture from single organisms. This was a complete failure in 76 such transfers. It was finally determined that for successful subculture fresh tubes of medium had to be inoculated with at least 10,000 individuals. The ciliates developed satisfactorily in the presence of both *Ps. pyocyanea* and Blastocystis. *C. M. W.*

Levitanskaia (P. B.). Observations sur le *Balantidium coli* en culture. [*Balantidium coli* **in Culture.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 3. [In Russian pp. 436–449. With 2 figs. [34 refs.] French summary p. 449.]

Working with cultures of *Balantidium coli* commenced from a single individual it was found that the dimensions of the ciliate varied with

the progress of the culture and the rate of multiplication which was most active 36 to 42 hours after subculture. Neither conjugation, endomixis nor encystment was observed. *C. M. W.*

MANDOUL (Roger). Que faut-il penser de la lambliose ? Les localisations des lamblias. Leurs possibilités pathogènes. [**Localization and Pathogenicity of Giardia.**]—*Jl. Méd. de Bordeaux.* 1939. Jan. 21. Vol. 116. No. 3. pp. 52–63. [40 refs.]

In this article the author critically reviews many of the claims regarding the pathogenicity of *Giardia intestinalis*. The conclusion is reached that only under very exceptional circumstances does the flagellate invade the gall bladder and its presence in large numbers in the bile drawn from the duodenum by tubage is no indication whatever of such an invasion. Many conclusive observations bearing on this point are quoted. Similarly the supposition that the flagellate may cause ulceration of the colon is based solely on the accidental presence of flagellates in lesions due to some other cause. The flagellate has no power of invading the tissues. It is merely an inhabitant of the surface of the upper part of the small intestine where it may, through some form of irritation, occasionally give rise to an enteritis. In large numbers of cases of infection there are no symptoms whatever. It is refreshing to read a careful paper such as this one at a time when the wildest claims are being made regarding the baleful influence of these flagellates on practically every organ of the body. The author's conclusion is that all that is known of the flagellate is that it lives in the duodenum, may sometimes give rise to enteritis and can be got rid of by only one drug, namely quinacrine (atebrin). *C. M. W.*

BONANNO (A. M.). Le forme cliniche della lambliasi delle vie biliari. [**Clinical Manifestations of Giardia Infection of the Bile Ducts.**]—*Giorn. di Batteriol. e Immunol.* 1939. Sept. Vol. 23. No. 3. pp. 386–403. [81 refs.] English summary (7 lines).

In reviewing the symptoms of giardia infections, as so many writers have done recently, the author assumes that the occurrence of a larger number of flagellates in the duodenal contents after administration of magnesium sulphate than in the contents withdrawn through the duodenal tube before its administration is evidence that the bile as it comes from the bile duct is infected with the organisms. He, however, goes further than this and has made X-ray examinations of the gall bladder after giving tetraiodophenolphthalein. This was carried out in 19 of the series of 37 cases. In some of the cases gall stones were seen. In six of the cases, including three in which gall stones were visible, cholecystectomy was performed. In the bile of the gall bladder of four of the patients, two of whom were cases with calculi, flakes of mucus were seen to contain large numbers of giardia, this in spite of the fact that all six cases had shown abundant flagellates by duodenal tubage. Three of the operated cases were followed for a year. The symptoms of colic previously present had completely disappeared but duodenal tubage still revealed giardia in two of the cases. As regards the symptoms due to giardia infection it would seem that in the bile ducts the flagellates irritate to some extent the mucosal lining but mainly act as mechanical obstructions to the flow of bile, giving rise to symptoms of biliary colic. *C. M. W.*

DE MURO (P.). **Clinical Aspects of Giardiasis.**—*Acta Med. Scandinavica.* 1939. Vol. 99. No. 1. pp. 78–91. [17 refs.]

In this article, which is largely a review of previous papers on the subject, the author adopts the view that *Giardia intestinalis* is highly pathogenic and gives rise to actual ulcerative lesions of the colon, hepatitis by invasion of the gall bladder and upper biliary passages in the liver and other ill effects. He refers to 45 cases of infection which he has himself studied. These, according to the symptoms revealed, may be grouped under four headings—enterocolitis, rectocolitis, entero-hepato-biliary syndrome, pancreatic insufficiency. The paper is characteristic of many which are appearing at the present time and in which it is assumed, without, so it seems to the reviewer, any scientific evidence, that the flagellates are responsible for the conditions described. [See MANDOUL above.] *C. M. W.*

DE MURO (P.) & IMPALLOMENI (R.). Studio clinico e radiologico della giardiasi. [**Clinical and Radiological Study of Giardiasis.**]—*Policlinico.* Sez. Med. 1939. Feb. 1. Vol. 46. No. 2. pp. 61–78. With 10 figs.

Of a series of 45 cases of giardiasis the authors subjected 15 to a radiological examination. This revealed conditions of duodenitis, cholecystitis, colitis and hypertrophy of the liver. *C. M. W.*

CHODZKO (W.). La lambliase en Pologne. [**Giardia Infections in Poland.**]—*Arch. Méd. Soc. et Hyg.* Brussels. 1939. Apr. Vol. 2. No. 4. pp. 339–354. [39 refs.]

In this article the author gives an historical account of giardia infections in Poland. He ranges himself on the side of those who regard the condition as serious and quotes a number of cases in which a variety of symptoms are attributable to the presence of the flagellate. He goes so far as to say there should be compulsory notification of the infection and that treatment should be carried out as a State measure. He considers that the infection is definitely on the increase, though it would seem to the reviewer more reasonable to suppose that this is merely apparent and the result of the intensive advertisement which has been going on for the past few years. *C. M. W.*

VÉGHELYI (Peter). **Giardiasis in Children.**—*Amer. Jl. Dis. Children.* 1938. Dec. Vol. 56. No. 6. pp. 1231–1241. [21 refs.]

The author believes that giardiasis in children is symptomless or nearly so in only one-third of the cases. In the others a variety of symptoms occur—anorexia, headache and dizziness, irregular and frequent movement of the bowels and uncertain abdominal pain usually after meals. The children are anaemic and thin. Muscular rigidity and pain on abdominal palpation were noted. The liver was sometimes palpable. Of 38 cases treated with acetarsone the infection was eradicated with disappearance of symptoms in all but three. The conclusion is that giardia infection in children is followed by an acute disease which may become chronic, leading to anaemia and abdominal complaints and impeding the normal development. *C. M. W.*

VÉGHELYI (Peter). **Celiac Disease imitated by Giardiasis.**—*Amer. Jl. Dis. Children.* 1939. Apr. Vol. 57. No. 4. pp. 894–899.

A boy, 25 months of age, showing symptoms of coeliac disease was found to have a heavy giardia infection. The child was seriously impaired in development, had a large protruding abdomen, hypotonic muscles, dry skin, anaemia, osteoporosis with low calcium and phosphorus values in the blood. Large, highly offensive and extremely fatty stools were passed two or three times a day. The absorptive capacity of the intestine showed a serious diminution. After the flagellates had been got rid of by acetarsone followed by atebrin treatment the child became normal. It is suggested that in cases of this type the possibility of a giardia infection should be borne in mind. It is supposed that the flagellates, by covering the mucosa of the intestine to which they adhere by their suckers, impair its absorptive capacity. *C. M. W.*

VÉGHELYI (Peter V.). **Absorption Studies in Children with *Giardia lamblia* Infection. A Preliminary Report.**—*Arch. Dis. in Childhood.* 1939. June. Vol. 14. No. 78. pp. 155–158.

An investigation of the fat absorption in 17 children with giardia infection has shown that this is defective, owing no doubt, to the covering of the duodenal mucosa by the flagellates. Eradication of the infection in 8 cases by treatment with arsenic and acridine was followed by return to normal of the fat absorption, together with improvement in the anaemia and impaired development.

C. M. W.

LABORDE (A.). Du rôle pathogène de certains parasites intestinaux occultes réputés inoffensifs. Des complications médico-chirurgicales de ces parasitoses. [**Pathogenicity of Certain Intestinal Parasites reputed Harmless.**]—*Gaz. hebd. Sci. Méd. de Bordeaux.* 1939. May 7. Vol. 60. No. 19. pp. 292–298.

In this paper the author quotes a number of cases in which parasites, such as *Entamoeba coli*, *Giardia intestinalis* and trichuris, usually regarded as harmless, have been associated with symptoms which have disappeared when the parasites have been removed. Statistics are produced which indicate, in the author's opinion, the too frequent association of these parasites with conditions demanding surgical interference for them to be regarded as innocuous. *C. M. W.*

GROTT (Józef W.). Die Lambliase als eventueller Krebserreger der Gallenwege. [**Giardia Infection as a Possible Cause of Cancer of the Bile Ducts.**]—*Schweiz. Med. Woch.* 1939. July 29. Vol. 69. No. 30. pp. 683–685. [17 refs.]

The paper is largely of a speculative nature and cites cases of malignant disease of the bile ducts in which a history of giardia infection was obtained in support of the conjecture that the flagellate may be a predisposing factor in the disease. *C. M. W.*

Cain (André) & Sikorav (Henri). La lambliase intestinale. [**Intestinal Giardiasis.**]—*Rev. Prat. Malad. des Pays Chauds.* 1938. Aug. 17th Year. Vol. 18. No. 8. pp. 349–52, 355–6, 359–60, 363–6.

The authors discuss the pathology and symptomatology of giardia infections. While admitting that many people are healthy carriers of the flagellate they conclude that in certain cases of intractable diarrhoea no other cause than the flagellate can be found. They express scepticism regarding colitis and symptoms attributable to invasion of the gall bladder and bile ducts. Quinacrine (atebrin) in usual doses will get rid of the giardia infection but only in those cases in which the flagellate is the cause of the trouble is the patient improved in health. If colitis is present then specific treatment for this must also be instituted. The authors observe that under the treatment the giardia alone disappear, other organisms, such as amoebae, chilomastix, spirilla, trichuris and blastocystis being uninfluenced by the drug.

C. M. W.

Chopra (R. N.), Das Gupta (B. M.), Sen (B.) & Ahmed (Z.). **Infection with *Giardia lamblia*—its Pathogenicity and Treatment.**—*Indian Med. Gaz.* 1939. Aug. Vol. 74. No. 8. pp. 458–460.

The authors have tested the action of atebrin in ten cases of *G. intestinalis* infection. The doses employed were those usually given for the treatment of malaria and in all cases the infection appears to have been completely eradicated. At the same time it was noted that the drug had no influence on chilomastix, trichomonas, enteromonas nor on *Entamoeba coli* or *E. histolytica*. The question of the pathogenicity of *G. intestinalis* is discussed and it is concluded that in some cases at least, particularly in children, it may cause intestinal disturbance.

C. M. W.

Menk (W.) & Mohr (W.). Zur Behandlung der Lambliose mit Atebrin. [**Treatment of *G. lamblia* Infection with Atebrin.**]—*Muench. Med. Woch.* 1939. July 14. Vol. 86. No. 28. pp. 1068–1070.

The authors report the successful treatment of a series of *G. intestinalis* infections with atebrin, which they now use in all such cases. They are far from convinced that *G. intestinalis* is such a pathogenic organism as many recent writers have maintained. *C. M. W.*

de Muro (Paolo). Atebrinbehandlung bei Giardiasis (Lambliasis). [**Atebrin Treatment of Giardiasis.**]—*Deut. Med. Woch.* 1939. Feb. 17. Vol. 65. No. 7. pp. 262–263. [10 refs.]

The paper reports the successful treatment of fifteen cases of giardiasis by means of atebrin. It was shown that flagellates obtained through the duodenal sound were killed in a few minutes by a solution of 1 in 200 of the drug. Two cases were treated by intramuscular injections of the drug but the action was less marked than after oral administration. The doses were those usually employed for the treatment of malaria. *C. M. W.*

NIÑO (Flavio L.). A propósito del tratamiento de la giardiasis. [**Treatment of Giardiasis.**]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1939. Jan. Vol. 15. No. 123. pp. 14–21. [14 refs.]

Eleven cases of *Giardia intestinalis* infection are recorded to illustrate the good effects of atebrin treatment in this condition. *C. M. W.*

ACOSTA SILVA (M.). Tratamiento especifico de las parasitosis por Giardia intestinal. [**Specific Treatment of Intestinal Giardia Infections.**]—*Gac. Med. de Caracas.* 1938. Oct. 15. Vol. 45. No. 19. pp. 298–300.

Writing of the specific action of atebrin in the eradication of giardia infections the author describes two cases in which long-standing abdominal symptoms which he attributed to *Giardia intestinalis* were abolished by this treatment. *C. M. W.*

BALENA (Alfredo). A giardiose e sua therapeutica. [**Giardiasis and its Treatment.**]—*Brasil-Medico.* 1939. Jan. Vol. 53. No. 5. pp. 113–119. [45 refs.]

The author gives a general account of giardiasis and reviews the various types of infection which have been described, including hepatic, renal and articular giardiasis. He shows that the majority of cases of the more common types of intestinal or duodenal biliary infection are cured by atebrin treatment. *C. M. W.*

DE MURO (Paolo). **Successful Treatment of Giardiasis in Man with Acranil—a Hydrochlorate of a New Acridinic Compound.**—*Acta Med. Scandinavica.* 1939. Vol. 102. No. 1–2. pp. 17–21. [22 refs.]

In this paper the author records the successful treatment of 18 cases of giardia infection with acranil (Bayer) which is described as a hydrochlorate of a new acridinic compound. The tablets contain each half a gramme of the drug, the dosage varying from half a tablet a day in the case of children under two years of age to three tablets a day in persons over 10 years of age. It is stated that though atebrin gives good results the new drug acranil is even better. In addition to the statements regarding treatment the paper contains many speculative assertions regarding the pathogenicity of the flagellates. It still has to be demonstrated that there is, as the author assumes, a condition of biliary duct giardiasis or that infections lead to pancreatic insufficiency. It is stated that in 1916 KENNEDY and ROSEWARNE reported the finding of 187 instances of pure giardia infection amongst 1,305 patients from the Dardanelles. No such figures were given by these observers [see this *Bulletin*, 1916, Vol. 8, p. 131]. The author is possibly referring to a paper by FANTHAM, not mentioned by him, in which 137 (not 187) such infections were found amongst 1,305 invalided soldiers [see this *Bulletin*, 1916, Vol. 8, p. 137.]

C. M. W.

Grott (J. W.). Ueber eine wirksame Behandlung der Lambliase mit Acranil, einer neuen Akridin-Verbindung. [**Effective Treatment of Giardia Infection with Acranil, a New Acridin Derivative.**]—*Muench. Med. Woch.* 1939. Mar. 10. Vol. 86. No. 10. pp. 373–374.

In a comparative series of cases of giardia infection the author has found that better results are obtained by the use of acranil, an acridin derivative issued by Bayer & Co., than of atebrin. Furthermore, atebrin may be toxic in certain individuals, a feature which is not displayed by acranil. This drug, previously named "sostol," is, in the author's opinion, the one of choice for the treatment of these infections. *C. M. W.*

MISCELLANEOUS.

Buxton (P. A.). **The Louse : Present Knowledge and Future Work.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. Jan. 29. Vol. 33. No. 4. pp. 365–379. With 1 fig. [13 refs.] [Discussion pp. 380–388. With 2 figs. Christophers (R.), Wigglesworth (V. B.), Mellanby (K.), Muir (E.), Brown (H. C.), Macdonald (G.), Lloyd (L.), Castellani (A.), Byam (W.), Stuart-Bunning (G. H.).]

Experimental work has determined the birth rate of the louse, the time taken in development, the length of adult life, etc. Calculations based on these experimentally determined facts show that allowing for a high death rate, comparable with that obtaining under normal conditions, one female will give rise to 1,000 viable female descendants by the 89th day and after that the numbers will increase even more rapidly. Counts of population made from infested heads show a great variation in number of insects found. There is some correlation between climate and frequency, for instance in the north of Nigeria lice are rarer in the hot dry weather than at other times of year.

Many control measures have been tried, but further research is needed before the perfect method is discovered. When its use is possible, a high temperature (52°C. for 5 minutes, 47°C. for one hour) is efficacious against all stages. It is probable that certain organic contact insecticides will prove valuable and future work may discover effective repellents.

The following are some of the facts which emerged in the discussion. Lice exhibit preference for a temperature of about 30°C. ; figures obtained in a northern industrial city in Britain show that about 30 per cent. of the children are infested with head lice ; 70 per cent. alcohol applied for 1 hour will kill head lice and their nits ; mustard oil may have insecticidal value ; sulphur taken in pill form (5 grains daily) is partly excreted by the skin and might perhaps deter lice from feeding ; troops wearing few clothes in the tropics offer less harbourage for lice and are less prone to typhus and relapsing fever. Lice in Britain form a social problem : only through educational measures—education of authorities, parents and children—are these insects likely to be eradicated. *Kenneth Mellanby.*

AUSTEN (E. E.) [D.S.O.]. **The House-Fly as a Danger to Health. Its Life-History and how to deal with it.** Fourth Edition. Revised by John SMART, Ph.D., Assist. Keeper, Dept. of Entom. British Museum (Natural History). Economic Series No. 1. 25 pp. With 11 figs. 1939. London: Printed by Order of the Trustees of the British Museum. [6*d*.]

In revising this well known pamphlet Dr. Smart has not found it necessary to make any great changes. The short, useful descriptions of those flies, including the "true housefly," which frequent our houses and the account of the life-history of *Musca domestica*, together with the notes on "houseflies and disease" remain almost unaltered.

Some new matter appears in the section on control. There is mention of a larva trap; this consists of a platform of battens which stands over a shallow tank containing water. Manure is stacked on the platform from where the migrating maggots drop into the water below and are drowned. Electric screens and traps for adults are regarded as being still in the experimental stage. Other control measures (against flies and larvae) are described which have been proved by experience to be effective.

The pamphlet is chiefly concerned with the housefly as a domestic pest in Britain; but to assist readers who require information on fly control abroad or in camps and the like, there is a short list of references to other literature. *H. S. Leeson.*

MACCREARY (D.). **Comparative Results obtained by the Use of Several Mosquito Traps in a Limited Area.**—*Jl. Econom. Entom.* 1939. Vol. 32. No. 2. pp. 216–219. With 1 fig. [Summarized in *Rev. Applied Entom.* Ser. B. 1939. Oct. Vol. 27. Pt. 10. p. 216.]

"As a result of comparing the catches obtained during July 1937 from five suction light-traps of the New Jersey vertical model distributed within the boundaries of Newark, Delaware, which enclose an area of about 1,000 acres with a population of approximately 4,500 people, it is concluded that, if no unusual topographical or sanitary conditions exist, one trap is sufficient to provide an accurate basis for estimating the density of the mosquito population in a community of a similar size. The three traps situated in the older and more densely populated part of the town showed rather higher average catches per night than the other two, probably because a greater attraction was exercised by the denser population and because there were larger numbers of water-holding receptacles to facilitate breeding of *Culex pipiens*, L. It is therefore suggested that the trap should be situated in the most densely populated area. Of the 2,455 mosquitos taken about 47 per cent. were males; this indicates that males are more active than is generally supposed. Details of the catches are discussed."

HULL (J. B.) & SHIELDS (S. E.). **Pyrethrum and Oils for Protection against Salt-Marsh Sand Flies (Culicoides).**—*Jl. Econom. Entom.* Menasha, Wis. 1939. Vol. 32. No. 1. pp. 93–94. [Summarized in *Rev. Applied Entom.* Ser. B. 1939. Aug. Vol. 27. Pt. 8. pp. 166–167.]

"An account is given of laboratory and field experiments carried out over a period of two years in Georgia and Florida, which showed that salt-marsh sandflies (*Culicoides*) may be excluded from houses by applying mixtures of concentrated pyrethrum extract and oil to the door and window screens. The pyrethrum concentrate was the extract of 20 lb. pyrethrum in 1 U.S. gal. refined kerosene, and the best mixtures were

1 part extract and 20 parts lubricating oil with a viscosity of about S.A.E.5, and 1 part extract, 6 parts kerosene and 12 parts lubricating oil (S.A.E.10). The mixture should be evenly and thoroughly applied with a brush or rag, and the rooms should then be well sprayed with standard pyrethrum extract spray to kill sandflies already inside the house. The treatment was reported to give protection for 24–48 hours."

Shchurenkova (A. I.) & Dolmatova (A. V.). Technique perfectionnée de la coloration des femelles du *Phlebotomus* pour la détermination des espèces. [**A Method of colouring Phlebotomus to determine the Species.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 6. pp. 929–931. [In Russian. French summary.] [Summarized in *Rev. Applied Entom.* Ser. B. 1939. Sept. Vol. 27. Pt. 9. pp. 183–184.]

"A method of preparing specimens of females of *Phlebotomus* is described by which the structure of the spermatheca and pharynx is made very clear. The insects are immersed for 16–19 hours at 60°C. [140°F.] in a mixture of 5 parts formic acid (or concentrated glacial acetic acid) and one part of a 20 per cent. solution of pyrogallic acid. The latter should be at least 24 hours old, to obtain satisfactory coloration. Instructions are also given for the preparation of specimens of *Phlebotomus* in Canada balsam."

Castellani (Aldo). **Some Little Known Clinical Signs Useful in the Diagnosis of Certain Tropical Diseases.**—*Jl. Trop. Med. & Hyg.* 1939. Sept. 1. Vol. 42. No. 17. pp. 261–263. With 2 figs.

The first of the four diseases referred to in this article, namely chronic amoebic colitis and the three signs clinically helpful in its diagnosis—the infra-ensiform tender spot, dullness in mid-axilla, and a band of dullness at the right base—has already been noticed in this *Bulletin* [1936, Vol. 33, p. 541]. In retrospective diagnosis of pappataci fever the author found the persistent facial erythema of much value; in one-fifth to one-third of the cases this sign remained for 7 and even 15 days after the temperature fell to normal. A punctate erythema of the soft palate might also be found and for the same length of time, but is less characteristic as it is seen also in some cases of dengue, typhus and relapsing fever. In erythematous conditions of streptococcal origin—and among these the author includes erysipelas, elephantiasis (filarial and non-filarial) and the lymphangitis associated with it, and scarlet fever—firm stroking with a blunt instrument is followed by a white line which remains for some ten minutes or more. He does not find it in rashes not of streptococcal origin. Lastly, in about half the cases of dengue (the proportion varies between 30 and 60 per cent. in different epidemics) he finds enlargement of the superficial cervical glands and sometimes the axillary and inguinal also. This adenitis may persist for three weeks after the fall in temperature, but suppuration never occurs. It may be of assistance in differentiating dengue from pappataci fever. *H. H. S.*

Baudart (M.). Le goitre endémique dans la région de l'Ebola. [**Endemic Goitre in the Region of the Ebola, Northern Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. June 30. Vol. 19. No. 2. pp. 129–142. With 1 map.

Two foci of endemic goitre are known in the Congo, one in the North and the other (Sampwe, see below) in the South. The northern, near

the river Ebola, was studied by the author. In three areas the percentages of the population found to be goitrous were 39·5, 52·18 and 6·09. The aetiology is thought to be intimately connected with the constant drinking of the water of the Ebola or its tributaries. The condition is more common in females than in males and though it occurs in children, is more frequent in adult life. It has no apparent connexion with other diseases and leads to no appreciable ill health. The author thinks that there is evidence that this affection is increasing.

In treatment no encouraging results were obtained with iodine alone and surgical measures under existing conditions are not advised. He therefore suggests that general hygienic measures, with improvement in the diet, should be undertaken, but the principal means should be to urge the natives to boil their water. *C. W.*

CALONNE (R.). L'endémie goitreuse de la région de Sampwe (Katanga). [**Endemic Goitre in the Region of Sampwe, Katanga.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. June 30. Vol. 19. No. 2. pp. 143–155. With 1 chart & 3 figs. on 2 plates.

In the Sampwe area where goitre is endemic there are to be found not only many examples of deaf-mutism, idiocy and cretinism, as in other endemic areas, but also instances of clinical hyperthyroidism. Among 1,118 natives examined, goitre was found in 274 and in addition 71 young people about the age of puberty showed diffuse hypertrophy, forming a total percentage of 30·85. Females were more affected than males in the proportion of 33·19 to 8·61 per cent. in one series, but the author points out that migration of males to industrial districts is considerable, and in those mining districts general hygiene is cared for. In the endemic area the gland increases in size with each pregnancy but this phenomenon is not seen in those women with existing goitre who have removed to other districts.

Endemic goitre in grandmother, mother and daughter in the Sampwe Region, Katanga.

[Reproduced from the *Annales de la Société Belge de Médecine Tropicale.*]

In three-quarters of the cases the goitre leads to no disability, in the remainder all stages of hypothyroidism are seen, or signs of hyperthyroidism develop. No estimation of the basal metabolic rate has been possible, but tachycardia, dyspnoea of effort, fine tremor and a temperature up to 37·6°C. without apparent reason indicate the diagnosis, though exophthalmos was only seen once. The author describes the typical symptoms of hypothyroidism seen. *C. W.*

VAN DER WALLE (N.). **Coccidioidomycosis.**—*Nederl. Tijdschr. v. Geneesk.* 1939. Nov. 25. Vol. 83. No. 47. pp. 5548–5554. With 5 figs. (4 on 1 plate). [13 refs.]

This article, though containing no fresh contribution to the subject, is valuable as summarizing knowledge up to the present. It deals with the cutaneous forms, coccidioidal granuloma, affecting face or extremities [see this *Bulletin*, 1938, Vol. 35, 459] and the pulmonary form which goes also by the names of San Joaquin Valley fever, or, more shortly, "valley" or "desert" fever of California [see this *Bulletin*, 1939, Vol. 36, pp. 507–8]. The article is embellished with photographs showing the lesions of face and foot, and of the growth of the fungus on Sabouraud-agar, in the mycelial vegetative and in the spherule parasitic stages. *H. H. S.*

HAULUSSY (M.) & SARDJITO. Rhinoscleroom op Flores. [**Rhinoscleroma in Flores.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Oct. 17. Vol. 79. No. 42. pp. 2626–2638. With 18 figs. (1 map) on 4 plates. [12 refs.]

Five cases of rhinoscleroma have been discovered on the island of Flores. These are confirmed by demonstration of the bacilli, by complement fixation test and by the histological picture. But it is not so much the discovery itself as the significance of the place of occurrence which is important. In the original investigations into the disease by SNIJDERS [this *Bulletin*, 1936, Vol. 33, p. 720] the view was put forward that the disease was one of ancient times and was dying out and that by its occurrence in Chota Nagpur, British India, a racial link could be suggested between people of the Munda-Kolar stem with the people of the Batak Islands which would date 200 B.C. The expectation also was that a disease affecting a primitive people would not be confined to Sumatra [this *Bulletin*, 1935, Vol. 32, p. 73], but would be found on other islands of the same chain. This expectation has been fulfilled and we have had reports of its occurrence in Bali, Java and, now, on the island of Flores. So far no cases appear to have been reported from the islands of Soembawa and Soemba. *W. F. Harvey.*

ZAKON (Samuel J.). **Contact Dermatitis due to Mango.**—*Jl. Amer. Med. Assoc.* 1939. Nov. 11. Vol. 113. No. 20. p. 1808. [Summary appears also in *Bulletin of Hygiene*.]

Two cases are recorded in which, 24 hours after the eating of mango, an erythematous and vesicular eruption with itching and swelling of the lips appeared. Patch tests in each case showed that the peel, not the fruit, was the cause. KIRBY-SMITH has shown that the peel before ripening contains a substance which affords protection from attack by insects and in some varieties this substance remains even

after the fruit ripens and causes " mango poisoning " in those who eat such fruit, and mango dermatitis is due to contact (in susceptible persons) " with the resin from the peeling or stem of the fruit or with the sap of the tree." The mango belongs to the Anacardiaceae, another member of which is the poison ivy *Rhus venenata*. In cases of acute facial dermatitis, we should think of the eating of mango fruit as a cause.

H. H. S.

Amir (M.). Over eenige gevallen van amok uit Noord-Sumatra. [**Some Cases of Amok in Northern Sumatra.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Oct. 31. Vol. 79. No. 44. pp. 2786–2798. [38 refs.]

There is nothing very special to remark on the five cases briefly described in this article. Amok among the Malays is known to occur with early neurotic symptoms, with a stage of panic, one of automatism, and to be followed by a period of depression and loss of memory. Two of those mentioned were associated with castration phobia, two with hysterical symptoms and nostalgia, and one with malarial encephalitis.

H. H. S.

Lall (Raghunandan) & Townsend (R. S.). **Ages of Epiphysial Union at the Elbow and Wrist Joints amongst Indian Girls.**—*Indian Med. Gaz.* 1939. Oct. Vol. 74. No. 10. pp. 614–616.

" The calculation of age by radiography is not as accurate a science as lawyers and some doctors seem to think. What we are striving at is to get an approximate age for Indian girls from skiagrams which, together with puberty, teeth and general appearance, will enable us to give more accurate evidence of age in court." This sensible view is one which needs emphasis in law courts.

The authors examined 125 girls of different communities, and between the ages of 10 and 18, in Lucknow. They point out that even in a skiagram it is difficult to determine the point at which union is complete but in their work they only considered this to be so if the epiphysial space was indistinguishable from the epiphysis and diaphysis. The table gives the details.

Number showing union in each age group.

	Years							
	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18
Number of girls ...	17	7	6	18	21	19	17	20
Lower end of humerus	0	0	3	16	21	19	17	20
Medial epicondyle ...	0	0	3	14	19	19	17	20
Upper end of radius	0	0	0	10	18	19	17	20
Lower end of radius	0	0	0	0	3	9	10	13
Upper end of ulna ...	0	0	0	15	21	19	17	20
Lower end of ulna ...	0	0	0	0	5	9	10	13

Summarizing these results the authors state that union of the *lower end of the humerus* takes place about the end of the 13th and beginning of the 14th year, the *medial condyle* at 15 years, the *upper end of the radius* at 16 years, the *upper end of the ulna* at 15 years and

the *lower ends of radius and ulna* at 19 years. These results are about 2 years ahead of those usually given in European textbooks of anatomy, and about 1 year ahead of those given previously by LALL and NAT [1934, *Indian Jl. Med. Res.* Vol. 21, p. 683] for Indian boys. The ages of the girls were, of course, known.

Menstruation starts in the majority of Indian girls between the ages of 12 and 14, and most of them show signs of maturity at 13.

A further table, too long to reproduce, is given comparing the findings of 19 investigations, in Europeans, Egyptians and Indians, into the age of union about the elbow and wrist joints.

[See also this *Bulletin*, 1938, Vol. 35, p. 927. Reliable standards are also needed in other countries than India.] *C. W.*

YOUNG (W. A.). **The Factors that influence the Physical Status of the Indian School Boy in East Africa.**—*East African Med. Jl.* 1939. July & Aug. Vol. 16. Nos. 4 & 5. pp. 131–147; 171–186.

The author made a comprehensive examination of 198 Indian boys of the Ismailia Khoja Mohammedan community of Dar es Salaam in November 1937, a month not in the malarial season.

The dental age was usually considerably in advance of the usual standards.

Comparing Indian communities from various parts of East Africa the author concludes that differences between them are more concerned with living conditions than race. Weight, height and various nutritional indices are considered and comparisons are made with European boys in Oslo and Great Britain. The Indian boy carries less subcutaneous fat than the European boy (in Europe) but that this is not a climatic adjustment is seen from the greater development in African children.

The diet of these Indian children is apparently rather meagre and is perhaps overweighted with carbohydrate. The vitamin content is fair. Rice and bread are the principal foods but milk, fish and meat are consumed in moderate quantities.

With regard to disease only 8 per cent. showed splenic enlargement, only 3 per cent. showed ova of helminths in the stools (by a simple floatation and smear method), no schistosomiasis or filariasis was found. This is remarkable in view of the fact that in the natives of Dar es Salaam the greater part of all stools examined reveal hookworm eggs, many urines contain schistosome eggs and one-third of the night bloods contain microfilaria. These findings are the more curious when it is realized that comparable Indian children in the island of Pemba show high spleen rates and considerable helminthic infestation. Haemoglobin estimations showed a fall from 90–95 per cent. in the 8–10 age group, to 70–80 per cent. in the 18–20 group, and the author asks if this anaemia may not be climatic in view of the lack of other obvious causes. There was, however, considerable history of fever, though little evidence of present infection, either by spleen or blood examinations, was seen. Drug prophylaxis was hardly practised but mosquito nets were much used.

Respiratory infections and ear troubles are common, and enlarged tonsils and their glands were found in 110 and 51 boys respectively. In contrast to the natives, enlargement of the inguinal glands was not common.

The author's final conclusion is that infection and race are not alone in giving these boys their present weight, stature and haemoglobin content, and that probably nutrition is the third factor. *C. W.*

SURRACO (C. A.). **The Characteristic Features of Hospital Construction in the Tropics.**—*Nosokomeion.* 1939. Vol. 10. No. 4. pp. 267–269.

In building hospitals in the tropics due regard must be paid to climatic features, ethnological characteristics especially where races are mixed, economic resources and the type of patients to be received. The principal emphasis in this paper is placed upon constructive technique.

The land at disposal should allow 200 square metres for each bed, and should be on high but protected ground. Congestion in the receiving rooms should be avoided by the construction of an adequate entrance pavilion. There should be a ward for new patients before they pass on to the permanent wards on the higher floors, and the sexes in these latter should be separated on different floors. The building should be raised on pillars without rooms at ground level, the space thus formed may be used for shade or the parking of vehicles.

The corridor plan should not be employed, but through ventilation should be ensured by adopting the redan system. Windows should be narrow but high, and it is not necessary that they exceed in area one-tenth of the floor space. Air conditioning, especially in theatres, is indispensable.

The roof should be flat, in terraces covered with earth and plants, and the wards should have a balcony on one side only, for the use of visitors, if possible with an outside staircase. Ample cornices for protection from rain and sun should be provided, but ornamentation should be avoided. *C. W.*

STEPHENSON (A. G.). **The Influence of Climatic Conditions on Hospital Construction.**—*Nosokomeion.* 1939. Vol. 10. No. 4. pp. 269–271.

Part of this paper deals with conditions in cold climates but the remarks on those in tropical countries are given most weight in this abstract as being of greater interest to readers of this *Bulletin.*

Insulation against heat is fundamentally the same as insulation against cold and it is the rate of heat exchange which must be limited. In hot climates direct solar radiation is intense and protection of outside walls and roofs is desirable and of window areas essential. All hospital planning should be open and well screened and the lowest floor should be well above the ground to allow for free passage of air under the floor. Glare and reflection should be minimized and lawns and flower beds used to absorb light and heat radiated from light coloured walls.

If possible the quadrangle plan should be adopted and balconies and verandahs screened against mosquitoes should be provided on every aspect. Air conditioning, though it could be applied in certain parts of hospitals, particularly theatres and out-patient halls, is costly and in Australia is therefore not a sound proposition to rely on for general hospital use. It would perhaps become so if it were proved that it led to such improvement in conditions that it significantly reduced the length of residence of the patients.

In both hot and cold climates cavities and air space should always be provided as a buffer between the inside and outside conditions. Glass areas should not be reduced but should be screened. Walls with collapsible glass frames but with verandahs wide enough to give protection are therefore advised. *C. W.*

FRIMODT-MÖLLER (C.). **The Planning of Tuberculosis Institutions in India.**—*Indian Med. Gaz.* 1939. Sept. Vol. 74. No. 9. pp. 559–568. With 7 figs. [Summary appears also in *Bulletin of Hygiene.*]

The author shows that modern institutions require the provision of facilities for laboratory and X-ray work, operative and light treatment, and especially for nursing. Institutions should be placed wherever they are most needed since there is no danger of spread to surrounding inhabited areas.

Two factors in India which require close study are the climate and the social customs, and more provision, for instance, for the separation of the sexes is necessary in that country than in most others. The sharp distinctions once held between hospital and sanatorium are now disappearing and the comparatively new development of settlements must be taken into acccount.

After these preliminary remarks, the author gives very complete details, illustrated with plans, of the construction of tuberculosis clinics and sanatoria, with remarks on ventilation, privacy, hygienic features, staff quarters, ex-patients' colonies and on the location of clinics in towns. These cannot be abstracted. Modifications for other parts of India are suggested, but, though dealing only with India, this paper contains much advice applicable to all tropical countries and authorities contemplating the construction of tuberculosis institutions in hot countries would be well advised to consult it. The author has rendered a service in giving the results of his long experience in this important but little discussed branch of tuberculosis administration in the tropics. *C. W.*

REVIEWS AND NOTICES.

EDWARDS (F. W.) [Sc.D., F.R.S.], OLDROYD (H.) [M.A.] & SMART (J.) [Ph.D., Department of Entomology British Museum (Natural History)]. **British Blood-Sucking Flies.**—pp. viii+156. With 45 plates (44 coloured) & 64 text figs. 1939. London: Printed by Order of the Trustees of the British Museum. [15*s.*].

"Illustrations of British Blood Sucking Flies," which consisted of coloured plates by Mr. A. J. E. Terzi and notes by the late Major E. E. Austen, was published by the British Museum in 1906. The book was soon out of print, and in view of the continued demand for it a series of new illustrations was prepared by Mr. Terzi in 1923; but Major Austen was never able to complete the text. The text has now been compiled by the authors cited above, who have produced what is, from the entomological standpoint, a very attractive volume. As in the earlier work the aim of this edition has been to provide in the simplest manner information of interest to non-specialists; technical terms

are so far as possible avoided, and no attempt has been made to give full descriptions of the insects; while in the Nematocera, the males (which do not suck blood) have been omitted from consideration. A brief summary has, however, been included of the known facts regarding the habits, life-history, and distribution in Britain of every blood sucking fly known to occur within the British Isles. In 1906 there were 2,700 known species of British Diptera, of which 74 were blood suckers. These figures have now grown to 5,200 and 117 respectively. The bloodsucking groups are the Culicidae, Ceratopogonidae, Simuliidae, Tabanidae, Muscidae (Stomoxydinae), Hippoboscidae and the bat parasites, Nycteribiidae. The book gives a compact account of the natural history of these bloodsuckers, with keys for the identification of the females. Their hygienic importance is only mentioned in passing; methods for the control of those species that are pests of man or animal are not discussed. The work is beautifully illustrated with 45 coloured plates and numerous line drawings in the text.

V. B. Wigglesworth.

It is with deep regret that we record the death on March 9th of Dr. A. J. R. O'Brien, C.M.G., M.C., Chief Medical Adviser to the Secretary of State for the Colonies and Chairman of the Honorary Managing Committee of the Bureau from 1938 to the date of his death.

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